The MINING CONGRESS JOURNAL

Volume 9 NOVEMBER, 1923 *Number 11*

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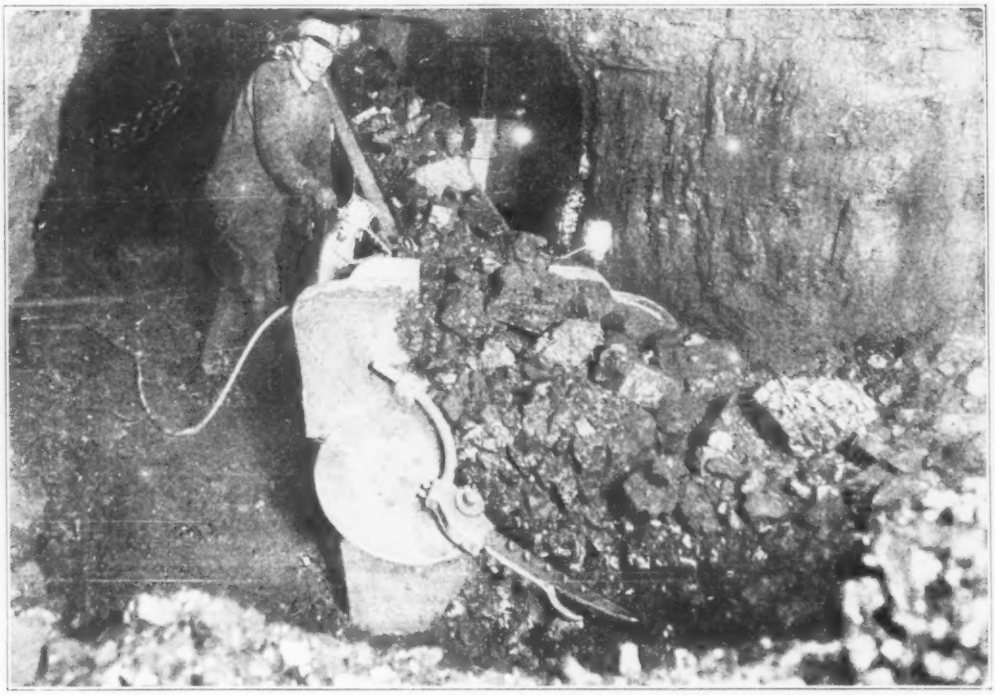

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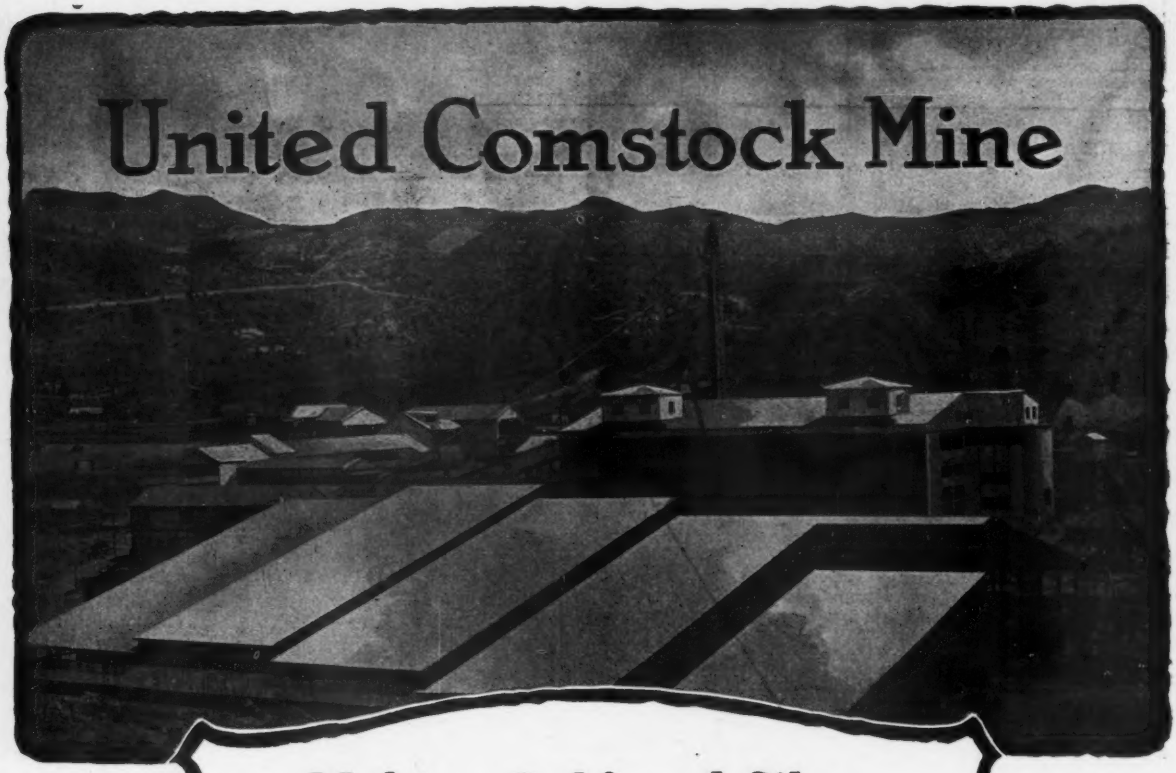

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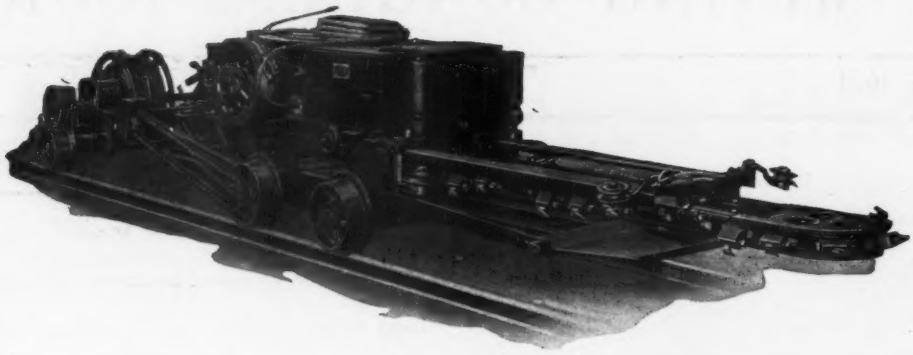

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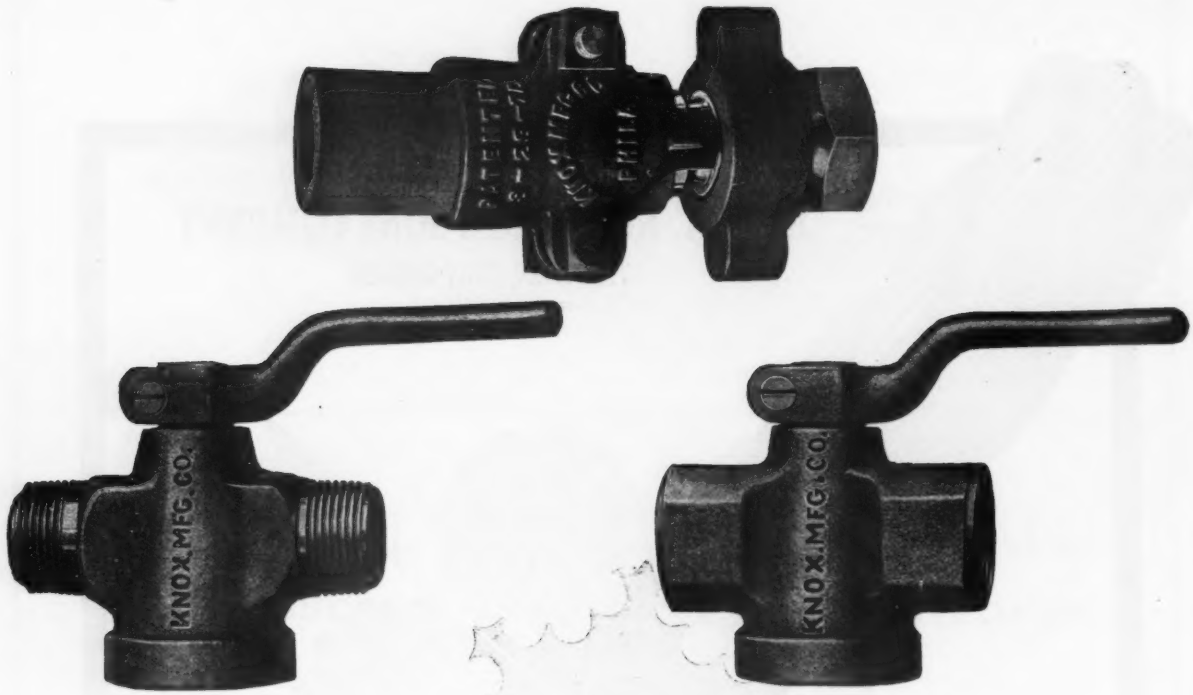

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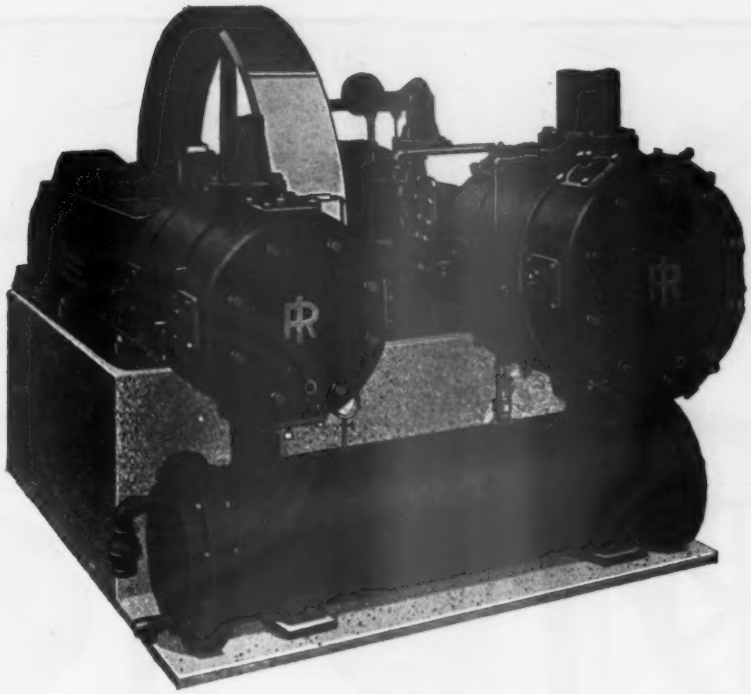

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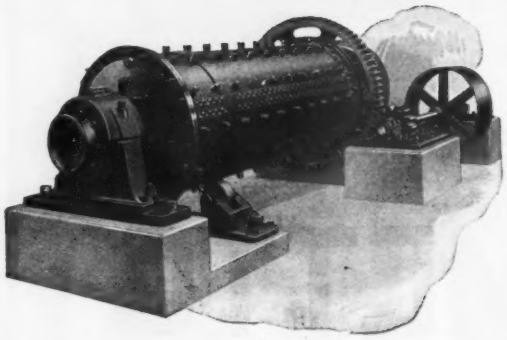

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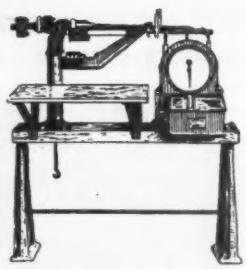

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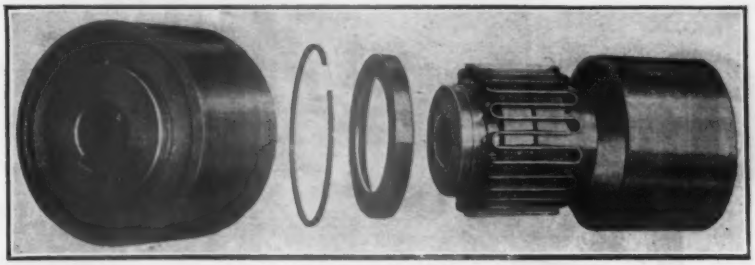

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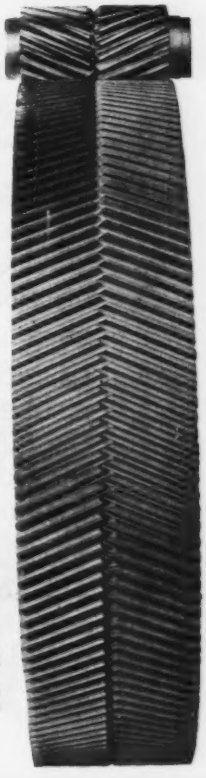

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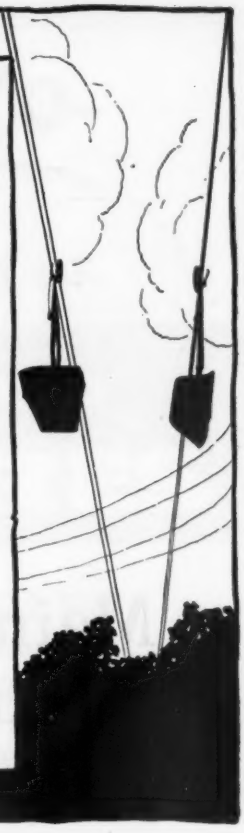

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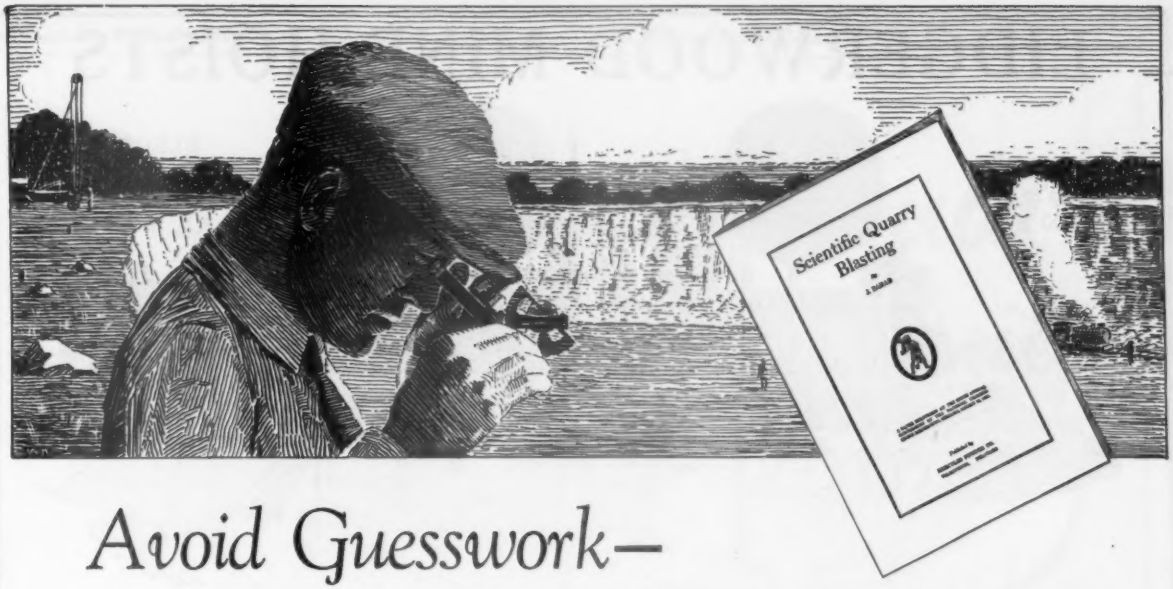

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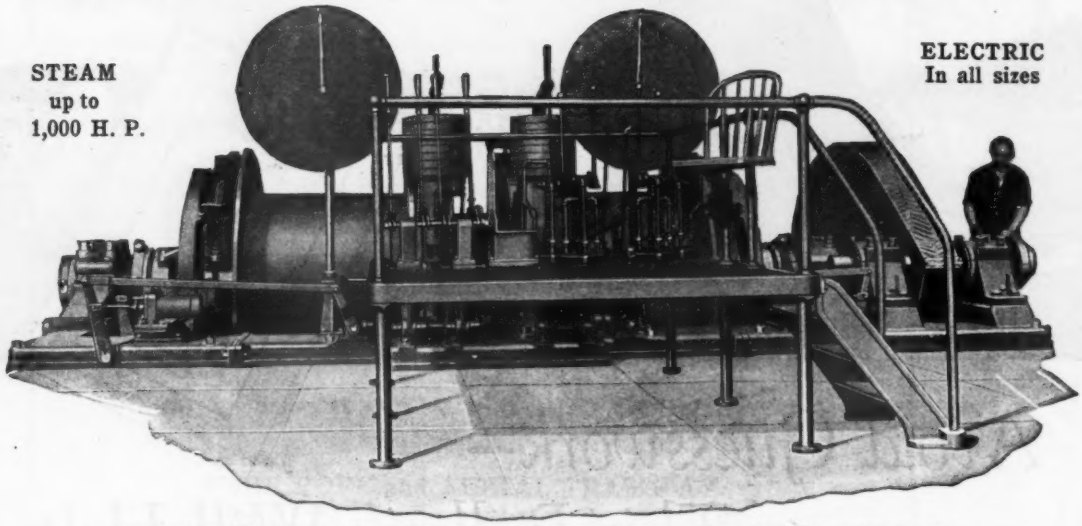

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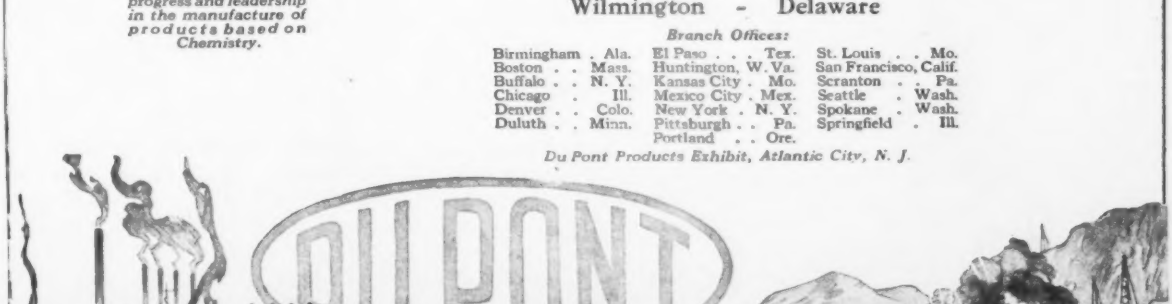

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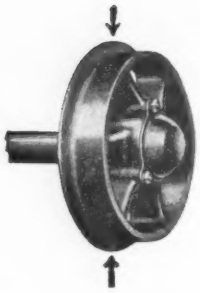

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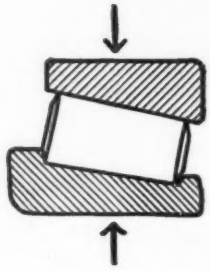
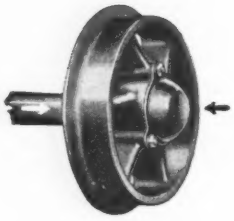
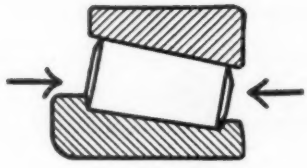
Radial Load

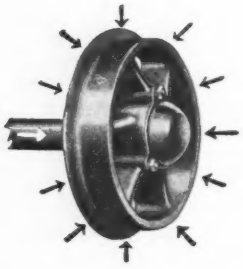




but also Flange or End

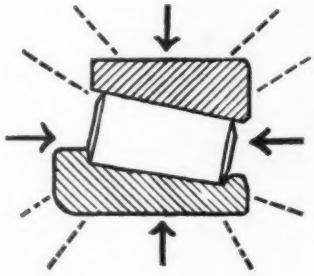
Thrust Load





together with all

Combination Loads



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ROLLER BEARINGS

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OUR VANISHING GOLD SUPPLY

AT THE PRESENT time the most unremunerative necessary business in the world is the business of mining gold. For many years prior to 1915 the world's production of gold in obedience to the continually increasing cost of the labor, machinery, and supplies required in production, had not kept pace with production increases in other lines. Incidental with these trying conditions the brains of the mining world applied themselves to the task of decreasing the cost of gold production, both in devising improvements to the mechanical means employed in mining and reduction, and in improvements to chemical and metallurgical processes of separation from the ores which carry it, the infinitesimally minute particles of gold.

If the reader will for a moment consider that the greater part of the world's production of gold is from ores carrying less than two dollars per ton, i. e., one part of gold to 58,333 parts of waste material, and further that most of this gold is found in chemical combination with other metallic substances, from which it must be liberated by some metallurgical process, he will begin to appreciate the monumental difficulties which lie in the path of profitable gold production. The finding of a needle in a haystack is not more difficult than the recovery of gold from its ore.

The perfection and application of the result of scientific investigation as applied to gold saving caught up with production cost in 1915 and resulted in an output that year, the greatest in history both in the United States and the world at large. Then the scale of prices took an upward turn, and in response gold production diminished in corresponding ratio. The operators of low grade gold mines are not greatly concerned with federal taxation. Their chief concern is of methods by which their operations may permit the payment of expenses from the production of low grade ore, in the hope of the discovery of a high grade ore body upon which a profit may be obtained. Instead of worrying about income taxes, the average gold miner is delighted with a discovery of means by which their operations can be brought into the class of profit earners.

Many people have bewailed the fact that gold mines have passed into private ownership. The ancient rule that all precious metals belong to the crown embodied the principle which this school of thought has approved. If these conditions now prevailed can there be any doubt that the Government would at this time push production to the limit and this without regard to production cost? And yet, by this course, its newly produced gold would undoubtedly cost it double its present value. It is the business of government to see to it that the purchasing value of its money is not impaired and this requires an ample gold reserve. How shall our gold reserve be protected? We shall not undertake to answer this question, but we can point out ways by which it cannot be done. It cannot be done by damming the intake and opening wide the outlet of our supply reservoir.

It cannot be done by decreasing the deposits and increasing the payment from our reserves.

It cannot be done by weakening the foundation while enormously increasing the structure of credit which that foundation supports.

It cannot be done by permitting those who use gold for other than monetary purposes to take from the Treasury at pre-war cost a supply of gold largely in excess of our regular production.

In nearly every country of the world gold is now at a premium, and the extent of that premium is logically measured by the scarcity of gold in each of these countries. A continually decreasing gold production is a continuing danger to the stability of every monetary system in the world. A problem is here created which calls for careful study. We are firm believers in the law of supply and demand as a remedy for industrial ills, but the law of supply and demand does not under present conditions apply to gold production. *The operation of this law as to gold is prevented by the greatest gold monopolist in the world. The United States Government, now controlling nearly half of the total world's gold supply and probably 95 percent of the domestic supply—is now in the market place, selling gold for industrial purposes at a price so low as to drive out of business every competitor in the gold supply market.*

We call the attention of the Department of Justice and the Federal Trade Commission to the unfair competition involved in this procedure. We object to these conditions, not only because of the fact that such procedure has not only almost annihilated a great industry but because the ultimate result of this process is likely to finally complete the destruction of the currency systems of the world. Is there a remedy? The only complete remedy will be a return to normalcy in prices. Prohibition of the melting and use of our gold coins for manufacturing purposes and a requirement that the users of gold for industrial purposes shall be required to buy in the open market rather than to take their supplies from the government monetary reserves would be one step in the right direction.

To quote from the address of President H. W. Seaman, of the American Mining Congress, at the Milwaukee Convention—*"If the government descends from its high pedestal as an administrator of equal justice and occupies a common stall in the marts of trade as a trafficker in factory gold, then the government as a good merchant should observe the rules of trade."*

GOVERNMENTAL TWADDLE

THE proposal of the United States Coal Commission to have the federal government regulate the coal industry in about the same way as common carriers engaged in interstate commerce are now regulated by the Interstate Commerce Commission would not merit the consideration of any serious-minded person if it had not been made by an agency of the government from which helpful suggestions had been expected. The public is concerned only with the problem of how to get coal when it is needed at a satisfactory price. The public is not concerned with the difficulties which coal producers are encountering in mining the coal. The Coal Commission has not solved the public's problem.

Neither the Interstate Commerce Commission nor any other federal agency can deal with the coal situation effectively unless the problem of labor relations is solved. And if that problem were solved there would be no need for regulation. The problem of the coal industry today is how to secure greater efficiency and a day's work for a day's pay; how to adjust labor disputes without strikes; how to require labor's as well as operators' adherence to contractual obligations; and how to protect men who want to work from the coercive and violent tactics of those who would deny them the right to work when and where they can find employment.

The Coal Commission recommends the creation of a division of the Interstate Commerce Commission to regulate the coal industry. To follow the principle of this recommendation to a logical conclusion, the federal government would, in the event of mutiny in the navy, create a division of the United States Shipping Board to see that full publicity was given to the inside operations of the Navy Department, and to prescribe rules and regulations to control the naval officers, naval boards, naval courts-martial, and everything else pertaining to the navy except the men and the mutiny. And, likewise, in case of a general desertion on the part of the soldiers of our army, have a division of the Interstate Commerce Commission, since military camps are located in several states and troops move back and forth in interstate commerce, require monthly, quarterly and annual reports from army officers and the War Department, and regulate the officers and military tribunals, but absolutely ignore the men who deserted.

Such methods would not stop the mutiny or desertion of men in the navy or army. In fact, still further acts of defiance and outlawry against the public and the government would be encouraged. That is the situation now in the coal industry. The remedy for this situation does not call for legislation. It calls for strict adherence on the part of the government to constitutional principles which guarantee enjoyment of private property and private rights and protection against unjust encroachments upon the civil liberties of law-abiding citizens.

If the government should become lax in the enforcement of constitutional law as applied to the military and naval forces of the United States, mutinies and desertions would be a common occurrence. As long as the government is lax in the enforcement of constitutional guarantees with respect to the rights of individuals to engage in any honest employment and work without unlawful interference, as long as the government does not hold accountable individuals or organizations who violate its laws. defy its principles, and conspire against the public welfare, strikes and massacres will continue to occur, despite the Interstate Commerce Commission or any other government regulating body.

Coal regulation by the Interstate Commerce Commission is not likely to find favor with Congress or the public. The Commission has enough to do to administer the laws relating to railroads. Many people can be found who believe that the Commission has not handled that job efficiently. Perhaps the Commission already is overloaded with duties under the Transportation Act. Rate questions literally swamp the Commission's staff. Its dockets usually are full. Valuation questions are unsettled and must be finally disposed of. The issuance of railroad bonds must be investigated and approved. Applications for purchase of new equipment, construction of new branch lines, abandonment of unprofitable branch lines, and consolidations of railroads must be acted upon.

A host of administrative tasks in connection with the laws relating to railroads require the constant attention and consideration of the Commission. The Commission should not be saddled with another responsibility, such as coal regulation, which might seriously detract from its efforts to deal properly with the problems of common carriers engaged in interstate commerce. To require it to undertake the regulation of the coal industry, in addition to the gigantic task of regulating rates and practices of railroads, would not be in the interest of good management and would not serve the public interest.

REVENUE BUREAU ADMINISTRATION

THE Commissioner of Internal Revenue has completely reorganized the Income Tax Unit. The trend of the reorganization is toward the coordination of the three general classes of work—auditing, engineering and legal—under three general divisions, with appropriate sub-sections established for each branch of industry or class of taxpayers. This result may not become an accomplished fact for several months, but the Commissioner's efforts in this direction are upsetting the old order of administration which has existed in the past.

Closer supervision of the audit, closer coordination of the work, and elimination of unnecessary steps in the handling of cases are reasons given for the reorganization. The changes have been in effect only a short time, so that it is impossible to determine whether or not they will fulfill the Commissioner's expectations.

Taxpayers have had to contend with a great amount of red tape in the adjustment of their tax liabilities. They have found it difficult to conduct negotiations with officials and divisions of the Income Tax Unit whose responsibilities were divided and whose functions overlapped. They will welcome the new arrangement if it prevents duplication of effort, of conferences, and of trips to Washington.

The Commissioner has a tremendous responsibility. Any mistake in adjusting the affairs of the Bureau of Internal Revenue or in matters of policy affecting the interests of taxpayers would be very costly. The importance of maintaining an efficient administrative organization and of perfecting the procedure necessary in handling seven million tax returns annually is therefore very great. It is hoped that the Commissioner's efforts to improve the Income Tax Unit will be successful.

FALLACIOUS DOCTRINES

THE doctrine that people have an inherent or vested interest in natural resources is responsible for many of the serious problems which today confront the mining industry. This doctrine has been circulated widely by radical theorists and demagogues. It has not been vigorously opposed or successfully combatted, and therefore has gained wide credence in the public mind.

State legislators cite the doctrine to justify the enactment of heavy super taxes on mining enterprises. Mine workers use it as a lever with which to pry wages upward. Advocates of nationalization of mines rely upon it to win public support for their schemes. Now, the United States Coal Commission adopts it as a reason for recommending government regulation of the coal industry.

It is one of the reasons why public sentiment has crystallized against the coal industry. It causes the enactment of unjust legislation. It blinds the public to facts which merit first consideration. It breeds class hatred. It is injurious. It is fundamentally unsound.

Such a doctrine is injurious because it leads to injustices. It challenges the right of individuals to profit by the extraction of wealth from the earth which their ideas and capital created out of the soil, the desert, the water, the mountains and the rocks. It seeks to deprive individuals of that which their genius, faith, persistence and capital developed at a time when people generally were skeptical and states denied public aid to ventures that were regarded as hopeless.

Such a doctrine is fundamentally unsound because it presupposes that so-called natural resources are of value as they are found in nature, and that this value is exhausted as the resources are removed from the earth. Few so-called natural resources are valuable in the original condition in which they are found. They are valueless until the genius and capital and perseverance of individuals put value into them. Their removal from the earth has not depleted the nation's wealth.

The application of the doctrine involves the anomalous proposition of conceding to the people, or the state, a vested interest in the ideas, the genius, the skill, the capital and the faith of the individuals who put value into some of nature's worthless materials in order to make them valueable resources. The doctrine does not recognize the fact that employment provided for the people, wages paid the workers, markets provided for agricultural products, tonnage furnished the railroads, public revenues derived as the result of increased taxable wealth, and the countless benefits which flow to the people, the state and the nation, are compensatory advantages.

Proponents of the doctrine talk of conservation. Their theory is that these resources are being exploited and wasted. Such a theory is preposterous. No resource is being wasted as long as it is being intelligently and efficiently utilized. Waste results from failure to utilize and from conditions which make utilization impossible.

High taxes which wipe out a profitable margin on low-grade products cause waste. High freight rates which prevent the marketing of products which would be valuable otherwise cause waste. Conditions imposed by paternalistic laws or by labor organizations whereby costs become prohibitive, and markets fail to yield to the law of supply and demand, cause waste. All measures which hold back the production of materials needed to supply the demand for such materials are wasteful.

If individual genius and initiative are left unshackled, the nation's resources will never become exhausted. The individuals engaged in the natural resources industries are creating new resources constantly by introducing new ideas, new methods and new capital into these industries. As stated recently by the Arizona Mining Journal: "Ideas and necessity are making resources far more rapidly than they are being removed. At the end of each year the total is greater."

The doctrine of the people's vested interest was not advanced until after successful development had been accomplished and individuals had begun to realize tangible results from their dreams and hopes and speculations. Before success came, individuals who acted upon their ideas, accepted the hazards, risked their fortunes, and suffered losses were considered fools. As success began to come they were hailed as public benefactors and contributors to the advancement of civilization. Now that success has been attained, the doctrine of "vested interest" or "public use" would make them soulless profiteers.

The Mining Congress Journal joins with the Arizona Mining Journal in combating fallacious doctrines concerning natural resources. The government and the people will not benefit through the imposition of unjust restrictions upon individuals whose ideas and capital are essential for future progress. The Mining Congress Journal believes that the ideas and faith and capital of individuals will supply the needs of future generations as they have those of the present and the past.

WASTE AND WANT

THE TERRIFIC waste of the World War is largely responsible for high prices throughout the world, and want and starvation in many of its parts. Waste, no matter what its cause, in proportion to its amount, has the same effect upon general prices. It is estimated that the bituminous coal strike caused a loss of over $2,000,000,000 as a direct loss to the miner, operator, the railroads and the consumer. Whether this estimate is correct or not as to the direct loss there can be little question that the indirect loss to the nation is fully as great, if not greater, than the loss to the parties who are directly concerned therein.

Wages are usually paid in money. Money is the medium of exchange. The value of the money received in wages to the wage earner depends entirely upon the amount of commodities which he can purchase therewith. If this loss is spread among the 100,000,000 people of the country, it will mean an average loss of $20 to each man, woman and child in the United States. If assumed by the coal miners themselves, it will be a loss of $2,600 to each individual coal miner.

In the end, the fact must be recognized that the more labor produces, the more it can have, and that higher wages, no matter how high, will be of no value to the wage earner, if production costs are increased in the same ratio that wages are increased.

THE ANTHRACITE STRIKE VICTORY

THE writer has been quoted by the press as stating that the anthracite strike settlement was an outrage. What he did say was that the so-called settlement was not a settlement but a forced surrender of the public right at the demand of an organized minority aided by the state government and an outrage upon the consumer.

No doubt but that the operators were temporarily relieved when the surrender was forced upon them; no doubt that the labor organization was duly elated over its substantial victory; no doubt Governor Pinchot believed he was rendering a public service and that the result would add to his political prestige; no doubt the consumers of anthracite coal will pay the bills; and no doubt that the operators have tried to protect the consumer and that this effort to protect the consumer was justified by a most selfish reason as well as by a desire to protect the public; no doubt that increasing costs of anthracite are increasing the development of anthracite substitutes which may make unprofitable the mining of the higher cost anthracite coal and thus make valueless large reserves which represent large capital investment and from which the state has collected large tax returns.

No doubt further that this is a winning of the first battle in the war for higher wages in the bituminous coal industry which cannot succeed except by the unionization of the non-union coal fields, and that the effort to accomplish this result will require a repetition of the lawlessness, incendiarism and bloodshed which has so frequently occurred when non-union operators have protected the rights of their workmen to earn a livelihood without paying the labor organization for the privilege and without surrendering their freedom; no doubt further that the anthracite surrender has inspired railroad workers to make similar demands and that these will lead to similar demands in other industries, all of which if aided by sickly sentimentalists in or out of public office will continue the process of card-house building until our whole industrial structure will fall.

No doubt further that this increase in wages is an obstacle in the road toward a return to normalcy which can never return except by a leveling of labor costs either by a lowering of abnormally high wage scales or a raising of the lower and normal wage scales which prevail in the gold mining industry. Gold is now, and probably always will be, the unit of value throughout the civilized world.

Universal wages must bear a proper relation to wages which the gold industry can pay from its production, the value of which is fixed by government edict as well as by universal acceptance.

The law of supply and demand now forced out of line by a minority for its own benefit, assisted by a foolish governmental interference, will eventually prevail and gold will undoubtedly remain the measure of values.

Water always finds its own level. Commodity prices subject to variation by local demand and transportation costs eventually adjust themselves to the law of supply and demand, and wages subject to local conditions and living costs must eventually yield to the same law.

The anthracite strike victory cannot permanently benefit even the men who have been victorious.

JEWELRY TAXES

THE Bureau of Internal Revenue has just announced that it is making a nation-wide drive for the collection of delinquent taxes on the sale of jewelry for the purpose of imposing heavy penalties wherever disregard or evasion of the law is disclosed. This is not the first time the Bureau has had to investigate the jewelry trade in order to compel payment of taxes.

Manufacturers of jewelry enjoy a peculiar advantage in the purchase of gold for manufacturing purposes. Gold is one raw material which can not be sold at a price sufficient to cover increased costs of production, because the price is fixed by statute and because the government sells gold to jewelry manufacturers instead of compelling them to make purchases of raw gold in the open market in the same manner as purchasers of other raw materials.

Enormous profits therefore are possible and are made by the jewelry trade. There is no excuse for their failure to pay excise taxes. The government should be unsparing in imposing penalties where tax evasions are discovered. The mining industry has no sympathy with such tax dodgers.

DOES THE SHOE PINCH?

WHAT is the matter with the farmers? Certain of their special champions have gone about the country picturing terrifying conditions of starvation and poverty on farms and have urged extraordinary measures of relief. Certain others of their well-known spokesmen are purchasing full page advertisements in eastern newspapers to show that they are in splendid financial condition. Who is the public to believe and what are the facts?

Possibly some of the vociferous champions of the farmers are finding that the honest, sturdy and independent tillers of the soil resent the calamitous implications and wails that have been spread broadcast. Probably the shoe is beginning to pinch. Certainly the reaction has not been favorable. Banks and business men generally avoid taking any chances where insolvency exists. Manufacturers and wholesalers undoubtedly have been reluctant to seek markets and allow normal credits where disaster is impending. And the outlook, as pictured by certain spokesmen for the farmers, has been anything but encouraging.

What the farmers themselves probably want the rest of the public to believe is this: That they are not suffering from conditions comparable only to those prevailing in Soviet Russia; that they are not so terribly oppressed as has been represented; that they are not so burdened with debt that their credit is gone; that they are not insolvent and in a condition of beggarism where only special benefits from the United States Treasury will save them.

The farmers have had their troubles. So have many other industries. But conditions are being righted. Less is heard about the farmer's poverty since corn went up to a dollar a bushel and crops began to be marketed. Instead, one hears about the large number of automobiles and radio receiving sets that the farmers are buying. It may be true that here and there conditions exist that are far from satisfactory. This is always the case, but it does not furnish an excuse for destroying the credit and purchasing power of a great industry by calamity howling.

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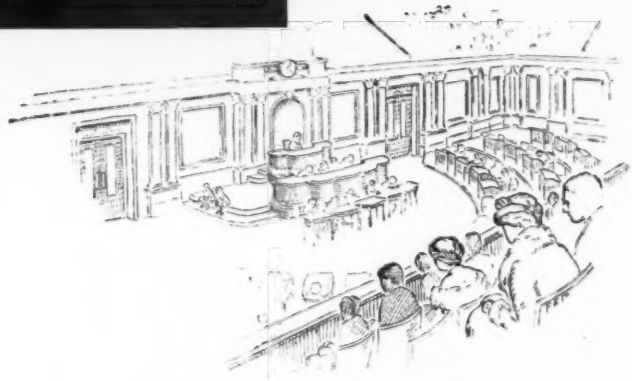


The Capitol Dome at night from the halls of the Senate Office Building

CONGRESS AND A DEPARTMENT OF MINES

Effort To Be Made by Senators Oddie, Nevada, and Shortridge, California, To Have Congress Enact Bill Creating a Department of Mines—Mining Congress Position Outlined

MINING is demanding its place in Uncle Sam's councils. Many activities at Washington on the part of those who delve for the ground's riches indicate that vigorous action will be taken in the Sixty-eighth Congress seeking at least equal federal recognition with those who till the earth's crust.

Numerous bills seeking governmental aid for mining through the creation of a Department of Mines have been introd[illegible] in Congress during the past few [illegible] upon which little action has been [illegible]. The late Senator Nicholson, of [illegible]o, sponsored a bill in the Sixty-[illegible] Congress, which got no further [illegible]e Committee on Mines and Min[illegible] the Sixty-eighth Congress both [illegible]s Oddie and Shortridge have an[illegible] their intention of introducing [illegible]or the creation of the long-sought [illegible]rtment of Mines.

[illegible]e American Mining Congress was [illegible]ganized for the primary purpose of [illegible]uring the enactment of a bill to create Department of Mines, with its head member of the President's Cabinet. [illegible]he mining industry is familiar with the [illegible]work already done by that organization, [illegible]hrough which was created the Bureau [illegible]f Mines, which was the first step look[illegible]ing toward the ultimate goal. That organization never has given up its original purpose, and unquestionably will endorse the proposed legislation and lend its influence in securing the enactment of such a bill. However, the volume of legislation that will come before the Sixty-eighth Congress—legislation that is exceedingly pressing in nature—may make it difficult to command serious consideration of any bill creating a new Cabinet official, with the attendant increased appropriation.

Early in 1923 the American Mining Congress appointed a committee to consider the advisability of concerted action on behalf of the mining industry, to secure the enactment of legislation creating a Department of Mines. This committee is thoroughly representative of the mining industry, its members being:

W. J. Loring, President, Carson Hill Gold Mines, San Francisco, Calif., representing gold mining.

Walter Douglas, President, Phelps Dodge Corporation, New York City, representing copper mining.

Bulkeley Wells, President, Smuggler-Union Mining Company, Telluride, Colo., representing silver mining.

George H. Crosby, Duluth, Minn., representing iron.

D. C. Jackling, President, Utah Copper Company, representing copper.

Carl Scholz, President, Raleigh-Wyoming Coal Company, Charleston, W. Va., representing bituminous coal.

S. D. Warriner, President, Lehigh Valley Coal Company, Philadelphia, Pa., representing anthracite coal.

At that time the American Mining Congress asked its members to express their wishes concerning an effort to have the Nicholson bill considered. The consensus of opinion then was that there already was too much governmental interference with the mining business and that the industry was not anxious for further meddling in its affairs by any kind of a governmental body, whether it be a commission, bureau, or department. Whether the mining industry has changed its mind regarding this phase of the legislation remains to be seen. Senator Oddie advances the argument in favor of the legislation that the mining industry has been shabbily treated and that it is of such national and international importance as to require the dignity of a Federal Department and a Secretary of Mines, and that such a department will minimize the troubles of the industry, instead of augment them.

The Sixty-eighth Congress will consider the reorganization of government departments, and the western Senators most interested in the success of the mining industry, believe this an excellent opportunity to secure the legislation. The proposed reorganization of departments, as recommended last session by the commission which investigated the matter, made no provision for a Department of Mines, but placed the Bureau of Mines in the Department of Commerce. The Bureau of Mines is the logical bureau around which the Department of Mines would be created. It is expected that Senator Oddie will be the chairman of the Mines and Mining Committee, to which any bill introduced for this purpose will be referred.

To fortify the bill against attack and to secure the united support of the mining industry, Senator Oddie will, in advance of the introduction of his bill, refer it to various mining interests, including the American Mining Congress, for suggestion, comment and criticism, with a view to securing every possible suggestion in order that the bill will be complete and embracing in its terms, and will have the solid backing of the mining industry. Senator Oddie will also seek to obtain the views of the various bureaus of the government affected by the proposed Department of Mines, in order that he may have for the consideration of the Mines and Mining Committee all elements entering into the situation. The legal phases of the bill are also being studied.

From Chicago News

While the plan of legislative procedure for this bill has not been mapped out, it is understood that the Mines and Mining Committee will seek to report out a bill creating a Department of Mines, which may either be pressed for individual passage or offered as an amendment to the general bill reorganizing the government departments, should such a bill be brought forward. It is understood that Senator Oddie's bill will provide for the inclusion in the new department the present Bureau of Mines and the Geological Survey, with a general provision for inclusion within the department such other existing government bureaus concerned with mining which may be necessary, and also any future bureaus which Congress may authorize to consider matters of importance to mining. Senator Shortridge has not yet announced his plan or outlined the provisions of his proposed bill.

The American Mining Congress believes that a Department of Mines would simplify the troubles of the mining industry, in that it would house in one general department all governmental activities in behalf of the mines, and will give the long-needed dignity and influence to which mining is entitled, as the nation's second greatest asset.

It is well recognized that the mining industry should have more assistance and less interference from the Government and that cooperative governmental aid should be given to prevent a scarcity of those metals which are the basis of manufacturing and without which our industrial progress must decline. The mining industry should present a united front for a Department of Mines and Mining.

SILVER INDUSTRY WEAKENED BY STATUS ABROAD

Government Bulletin Analyzes Factors Stifling Silver Industry—Many Countries Abandoning Silver Coinage — Senate Commission Expected To Evolve Remedial Measures

THE decline in the world's consumption of silver and the demonetization of silver coinage in the countries of Europe and South America has caused serious depression in the silver industry. The nature and extent of war and post-war variations in monetary demand for the metal have been analyzed in a recent trade information bulletin published by the Department of Commerce.

The monetary status of silver has been changed in many foreign countries where earlier currency standards have been torn down or altered by the economic effects of the war. According to the government bulletin, "during the earlier years of the conflict and before the currencies of belligerent nations became greatly depreciated silver remained in circulation. The rapid rise in prices, coupled with a feverish increase in industrial and commercial activity for both warring and neutral states, caused an insistent demand, at least in most European countries, for large additions to the circulating media. This need for greater amounts of hand-to-hand currency was met in part by new supplies of fractional silver coin."

Conditions then arose which tended to restrict monetary demands for silver, and certain countries succumbed to an inconvertible paper currency. In these countries, the bulletin states, "practically all metal has been driven out of circulation except copper or nickel alloys, or other cheap compounds which have lately been minted to some extent in order to meet a natural desire for 'hard money' in minor payments. * * *

"It is natural that the establishment of an inconvertible paper currency at a time of high silver prices should have encouraged the dissipation of silver in reserves as well as in circulation, and the effective loss of silver coins through hoarding, melting down, and export on public or private account, or both."

In some countries, according to the report, the content or fineness of silver coins has been reduced to maintain them in circulation. In other countries, escaping currency depreciation, silver has continued to circulate with no change in the weight or quality of the coins.

The bulletin summarizes the final results of the department's investigation as follows:

"1. The use of silver for reserve purposes has declined since 1914 in most countries, both absolutely and in proportion to gold and other forms of cover for note issues.

"2. Numerous forces have operated to reduce the relative importance of silver as a circulating medium.

"3. In many countries there has been a reduction in the fineness or content of silver coins.

"4. No movements appear to be in progress to justify an assumption that silver will soon regain its pre-war relative position as reserve for note issues or as a circulating medium."

In its conclusions, the department finds that the analysis of world use of silver as a circulating medium does not encourage an assumption that demand will greatly increase in the near future for coinage purposes; that if monetary consumption of silver is to regain its pre-war relative importance as compared with gold, the unfavorable factors must be overcome; or their influence must be negatived by other forces, not yet in general evidence, which might be expected on their part to increase coinage and circulation demand for silver. These unfavorable factors are as follows:

"1. The reduction in weight or fineness of silver coins in at least 14 countries.

"2. The great extent to which inconvertible paper in the majority of belligerent as well as many neutral states has driven silver out of circulation and caused it to be hoarded or sold abroad despite embargoes on exports or laws against melting down of coins by private parties.

"3. The general readiness with which people in countries retaining at least a legally convertible currency have accepted paper or baser metal substitutes for silver formerly used."

It is found that among the cheap metals and compounds used, bronze, aluminum, nickel, copper and iron seem to be coming into more general monetary use. Hungary has new aluminum and iron coins; France has been minting bronze-aluminum pieces since 1920; Japan has substituted nickel for silver in her 10-sen piece; until the most recent deluge of paper, Germany attempted to keep in general use the 50-pfennig aluminum coins which had taken the place of earlier silver money of the same denomination; nickel tokens are appearing in Belgium, as well as bronze-aluminum 1-franc coins to replace notes of the same face; Italy has new nickel coins; in Brazil new aluminum and copper pieces appeared among the fractional currency in 1923.

In a few countries silver circulation has increased since 1914—particularly in China and India. But the bulletin holds little comfort for the silver producers for the immediate future. It concludes in part with the following statement:

"With the completion of stipulated Pittman Act repurchases by the United States Government, the last artificial stimulus to monetary demand for silver has been removed, and present trade demands for fractional money do not seem to be so strongly focused upon silver, or even upon specie of any kind, as to warrant the expectation of a greatly increased monetary use of the metal in the near future."

The Senate Commission of Gold and Silver Inquiry has been successful in accumulating a vast store of information. The data made available to the commission by the Finance and Investment Division of the Bureau of Foreign and Domestic Commerce, together with that gathered by the commission, should lead to recommendations to Congress which will make possible the restoration of the silver industry. The commission's report will be awaited with intense interest by those interested in world economic conditions as well as by the silver industry which has at stake its future prosperity.

ALASKAN WATER POWER

In denying that Alaska lacks sufficient water power for industries, Secretary of Agriculture Wallace says that power is being developed in the mining industries near Juneau and Ketchikan.

SILVER FACT FINDING COMMITTEE APPOINTED

Twelve Leaders, Representing Silver Producers, Smelters and Refiners, International Finance, Engineers and Metallurgists, Will Study Silver Problem

THE Silver Fact Finding Committee which was authorized at the Reno Silver Conference just has been appointed by Mr. W. Mont Ferry, chairman. The resolution authorizing the appointment of this committee is as follows:

Resolved, That it is the sense of this convention of silver producers, assembled at Reno, Nev., this 4th day of September, A. D. 1923, that:

1. A Silver Export Association be organized under the Webb-Pomerene Act and under such amendments to such acts as may be had.

2. That a committee of not less than 15 members representative of the silver mining industry of the United States and such other countries as desire to participate, be appointed by the Chair within two weeks from date, which committee shall be authorized and directed to proceed immediately to the consideration and formulation of a plan, and if a satisfactory plan can be agreed upon, that such an export association be organized.

3. That said committee shall have power to appoint a sub-committee or sub-committees to conduct such work and to act, subject to the approval of the committee.

4. That the committee shall from time to time, as may be advisable, report their action to the members who now constitute, or who may hereafter constitute, the membership of this body, or any body arising therefrom.

The committee's duty is to collect facts affecting the silver industry and to formulate a plan for its improvement. Its spirit will be constructive and cooperative, and its aim will be to unite in one purpose the producer, the smelter and refiner, and the marketing agency. It will study the question involved from the standpoint of world conditions.

As soon as this committee has formulated some plan silver producers will be reassembled, the plan submitted, and definite action taken to carry on aggressively a plan as finally approved. The committee members are as follows:

C. F. Kelley, President, Anaconda Copper Company, 25 Broadway, New York City, chairman.

Charles Bocking, General Manager, Butte & Superior Mining Company, Butte. Mont.

F. H. Brownell, Vice-President, American Smelting & Refining Company, 120 Broadway, New York City.

Fred Carroll, Vice-President and General Manager, Atlas Mining & Milling Company, Ouray, Colo.

Stanley A. Easton, General Manager, Bunker Hill & Sullivan Mining & Concentrating Company, Kellogg, Idaho.

John Hays Hammond, Room 2902, 120 Broadway, New York City.

Alfred Harrell, President, California Rand Silver, Inc., Ransburg, Calif.

Dr. C. A. Holder, President, Asia Banking Corporation, 35 Broadway, New York City.

J. G. Kirchen, General Manager, Tonopah Extension Mining Company, Tonopah, Nev.

E. J. Raddatz, President, Tintic Standard Mining Company, Salt Lake City, Utah.

F. Y. Robertson, Vice-President, United States Smelting, Refining & Mining Company, 120 Broadway, New York City.

Robert E. Tally, General Manager, United Verde Mining Company, Clarkdale, Ariz.

There are three vacancies on the committee, which will be filled as soon as it is desirable. Careful consideration is being given to Mexican and Canadian representation and announcement of these appointments will be made at a later date.

It is proposed that the committee shall be called together at an early date for the consideration of some plan to be of assistance to the silver producers.

Real results are to be expected of a committee of such distinction and ability.

Gold and Silver Commission

With the convening of Congress members of the Senate Commission on Gold and Silver are expected to assemble in Washington for the purpose of drawing up a report to the Senate on the gold and silver situation. Since the Reno meeting early in September the members of the Commission and their assistants, together with prominent men in the gold and silver industry, have given much consideration to the question with a view of developing some means to overcome the existing handicaps which prevail in this important industry. The staff of the Commission has been active here in Washington in assembling and analyzing various data bearing on the situation which will be the basis of the Commission's report and recommendations to Congress. Much of those data are of an intricate statistical nature, requiring acute analysis, and for this purpose and the additional idea of making its conclusions more clear, illuminating charts are being prepared for elaboration of the text of the Commission's report. Among these data may be mentioned fluctuations in foreign exchange currency rates. Statistics of this character are being obtained for 18 of the principal countries of the world covering the post-war period from November, 1918, to April, 1923. The countries to be covered in this analyzation of currency rates of exchange are England, France, Italy, Norway, Denmark, Spain, Argentina, India, Germany, Belgium, the Netherlands, Switzerland, Sweden, Canada, Brazil, Chile, China and Japan. The Commission is making an economic analysis of these data to determine the causes for the principal changes which have taken place in exchange rates, with special reference to the influence of credit and currency deflation, reduction of gold and silver reserves, and other factors, which it says will demonstrate the adverse effect of depreciated foreign currency upon the foreign trade of the United States.

Mining Men Heard

As evidence of its desire to obtain the fullest expression from the mining industry on plans to assist it in overcoming existing conditions, the Commission is affording gold and silver producers an opportunity to present their ideas at hearings in the field, which obviate the necessity of expense on the part of producers, which would otherwise be occasioned by hearings at Washington or other places not convenient to the producers. In this work Fletcher Hamilton, who was especially engaged by the Commission, is meeting producers in the field and taking testimony which will be furnished the Commission for consideration in advance of preparation of its report to Congress. Up to this time Mr. Hamilton has met producers at Deadwood, S. D.; Denver; Cripple Creek; Leadville; Ouray and Salt Lake, and will continue the hearings at other mining points up until the time the Commission is ready to receive his final report. Other data are being collected by the Commission through a questionnaire which has been sent to copper producers and it is said that the copper men are cooperating in furnishing data to the Commission which it is expected will be helpful in reaching important conclusions.

Pittman Act Purchases

There have been no important developments in the matter of allocations of silver under the Pittman Act for subsidiary coinage and their revocation by the Treasury, which according to some members of the Commission, acted to the disadvantage of silver producers in that it deprived them of what might have been additional sales of silver to the government under this act. The Comptroller General, in a letter to Senator Fittman (Dem., Nevada), who is charged by the Commission with special investigation of this feature of the inquiry, reaffirms his decision of a year ago when he upheld the right of the Treasury to revoke allocations of Pittman silver previously made for subsidiary coinage. Under-Secretary of the Treasury Gilbert, in a recent letter to Senator Pittman, charged that the Senator was not responsible for the law bearing his name, declaring it had been drafted by the Treasury Department and that the provision for the purchase of American silver was inserted as an amendment by Senator Fall (Rep., New Mexico). This statement is expected to be challenged by Senator Pittman when he returns. Another element has arisen in this situation from the fact that recently the Comptroller General authorized the Treasury to make a book transfer of 2,441,000 ounces of recoinage silver from the Denver mint to the Philadelphia mint, although the silver was not actually handled between the offices. The explanation for the transaction was that the Denver mint did not need the silver for subsidiary coinage but that the Philadelphia mint did. Under this transaction the Denver mint will carry standard silver bullion account instead of recoinage silver account for this silver, while on the Philadelphia mint records the accounts will be reversed. It was stated that this book transaction obviated the necessity for the purchase of silver for subsidiary coinage when mint stock of silver was ample.

GOLD STORES

The gold situation was discussed by Governor Crissinger of the Federal Reserve Board at Harrisburg. He stated that adjustment to a general downward tendency of prices is difficult because of the continued flow of gold to this country. "There is temptation to inflation of currency when the supply is so generous," he said. "A few years ago every added million of gold that came was greeted as further guarantee of soundness and prosperity. It was assumed we could not have too much money circulating provided it was solidly based on gold. We know better now. No one has found a way to stop the movement of gold to this country, but many realize the menace of this condition. Business men recognize the real danger of having too much gold and the necessity of avoiding inflation."

IRON ORE FURNACE IMPROVEMENT

THE study of the reduction of iron ore in the blast furnace, which has been in progress for four years by the Bureau of Mines, Department of the Interior, at Minneapolis, and which has resulted in the successful development of an experimental blast furnace by the Bureau's metallurgists, has yielded data that may lead to important modifications in the present design of blast furnaces. The Bureau of Mines engineers are able to make iron successfully in a small furnace stack only 20 feet high, and the tests show that a considerable part of the stack is inactive, so far as reducing effect of the furnace gases on the ore is concerned, between the combustion zone and the zone near the top where reduction is actively going on. Since nothing happens in this part of the stack, if the same conditions hold true in commercial blast furnaces the present tall stack universally employed could be shortened, thus reducing cost of construction, and size and cost of equipment such as the blowing engines that drive the furnace. Further work is being vigorously pushed with the object of tying up the experimental results with those obtained in commercial furnaces.

This furnace, the only one of its kind in the world, had been regarded as impracticable by many leading iron metallurgists. The furnace has a hearth diameter of 20 inches and a height of about 20 feet, and two successful runs have been completed with every operating detail under perfect technical control. With this furnace, which can be operated at comparatively small expense, the Bureau of Mines is now in position to make a scientific study of the blast furnace process and to attack various problems, the solution of which should be of value to the industry.

Since the furnace is operated for obtaining information, special provisions have been made for taking observations. Openings introduced at five levels up the side of the furnace were provided so that the gas samples, samples of solid stock, temperature and pressure observations could be taken as a means of determining the more important chemical and physical reactions occurring within the charge column. Work of this character is a continuation of the efforts of Ebelmen, Bunsen, Bell and other earlier investigators, to obtain data on the changes which occur in the smelting of iron ore as the descending materials, charged in the top, encounter the ascending gas stream from the combustion or tuyere zone of the furnace. The blast furnace process is known to consist of a series of inter-dependent reactions, and information concerning the materials charged, the gas given off, and the products tapped from the furnace, is inconclusive. In order to make an effective study involving as many variables as are contained in the blast-furnace process, it is necessary that the investigators be able to change the independent variables at will without regard for commercial considerations. This can only be accomplished by means of an experimental furnace operated solely to obtain information.

With a furnace whose operation can be controlled and which will make pig iron, ferromanganese, and spiegeleisen, the Bureau of Mines is now in position to undertake a study of special problems. In cooperation with the University of Minnesota, a new furnace, designed by the Bureau, will be constructed in the new mines experiment station now ready for occupancy. The problem of utilizing the low-grade manganese ores of the Cuyuna Range will be undertaken as soon as this furnace is completed. Facilities for handling materials, as well as for sizing, crushing and sintering them, are now available. It is believed that this study will eventually lead to useful information regarding:

(a) Utilization of non-merchantable manganiferous iron ores.

(b) Furnace design from a metallurgical viewpoint.

(c) Fundamental data on the blast-furnace process.

(d) Combustibility of coke.

ALASKA RAILROAD FREIGHT INCREASED

Freight on the Alaska Railroad increased in volume three times the record of a year ago during the month of July, according to a statement issued by the Bureau of Mines. Tonnage for July, 1923, was 7,500, as compared with 2,500 in 1922.

The flood of shipments on the boats operated by the government on the Nenana and Yukon Rivers has been so great during the late September prior to the general freeze-up that they have been taxed to their fullest capacity, the message says. By strenuous efforts the boats succeeded in delivering all freight, but the big problem confronting the railroad is to get the river steamers back safely to the ways at Nenana before the freeze-up.

The bridge on the branch of the Alaska Railroad to the Healy River coal field will be completed this month, making the coal mined in this district accessible for domestic and railroad consumption.

NOTES ON MINE AIR CONDITIONING

By MARTIN J. LIDE
Consulting Mining Engineer

THE fundamental purposes of mine ventilation may be summarized as follows:

(a) To provide fresh air for men and animals.

(b) To dilute explosive gases.

(c) To retard the moulding and rotting of timbers.

At the beginning of the present industrial era of intensive development and production, the physiologic consideration of providing ample fresh air for breathing appears to have been dominant. In fact, even at the present time the principal fixed requirement or quantitative standard of mine ventilation as fixed by the laws of many states consists in providing for a certain minimum cubic feet of air per minute per man or per mule. The inherent difficulties in fixing any rational quantitative standard of mine ventilation are generally understood. The quantity of ventilation, for example, which, in a non-gaseous mine would be ample for physiologic purposes, would be utterly inadequate in a gaseous mine where dilution of the gases is imperative to the safety of the mine.

But gas in a gaseous mine is liberated very largely from new workings. Therefore the more rapid the development of the new workings the greater the rate of production of gas, and the greater the necessity for increased ventilation for purposes of dilution. The very general introduction of mining machinery in this country has made possible rapid development of new workings, with a consequent increased demand for higher quantitative standards of ventilation in diluting the increased quantities of gas liberated. The danger of general gas explosions has been greatly minimized by the mining industry, in providing adequate ventilation for purposes of gas dilution. Gas explosions are now almost invariably local in all well operated properties, and unless augmented by dust do comparatively small damage. But the solution of the gas problem in coal mining has brought about very much more elusive, dangerous and destructive hazards, due to the following:

(a) The more rapid production and accumulation of dust with the intensive production due to cutting machines, power drills, loading machines, high-speed locomotives, etc., and the wider distribution of this dust throughout the mine, due to the large volumes of air currents.

(b) The seasonal and periodic drying out of mines, with the ever present danger of a general dust explosion originating from some local explosion.

(c) The rapid cracking and disintegration of certain classes of mine roofs with resulting casualties from rock falls, due to the alternate expansion and contraction of the roofs resulting from the continual alternate wetting and drying out of the roofs with variations in external atmospheric conditions.

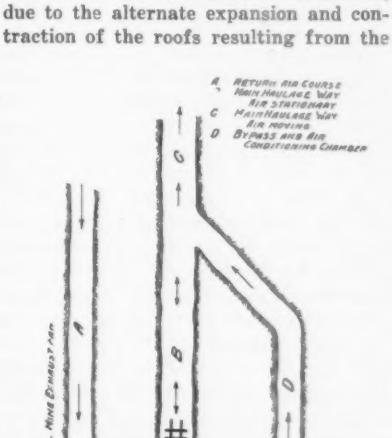


FIG 1

Diagram of general method of admitting conditioned air to drift and slope mines

That these problems are real problems—and unsolved problems—is attested by the several disastrous general dust explosions occurring during the past year in well equipped, well organized and skillfully operated properties. It is further attested by the large annual casualty list resulting from rock falls in the mines of this country.

The purpose of this paper is to consider the conditioning of mine air in its relation to these important problems.

It is well to bear in mind the composition of atmospheric air. As is well known, it is a mixture composed principally of two uncombined elemental gases, oxygen and nitrogen and mixed in the proportion, roughly, of 4 parts of nitrogen to one part of oxygen by weight. The oxygen and nitrogen may be considered as highly superheated vapors; that is to say, their temperature under atmospheric conditions is several hundred degrees above the temperature of the liquids from which they have boiled. In addition to oxygen and nitrogen, however, there are small quantities of other gases and vapors in the atmosphere, the principal of these, especially from the standpoint of this paper, being water vapor. The great difference in behavior between the oxygen and nitrogen in the atmosphere and the water vapor is that whereas, as stated, the oxygen and nitrogen are very highly superheated gases, the water vapor has a temperature very close to the boiling point of its liquid, and therefore carries low degrees of superheat—and when the atmosphere is saturated with moisture—no super-heat at all. The principal gases, therefore, act as perfect gases, whereas the water vapor having very little superheat is an imperfect gas and introduces into the atmosphere many irregularities of behavior.

The fundamental law of gas mixtures known as Dalton's law states that the resultant pressure of the mixture of several gases is the sum of the individual pressures of each of the component gases. Let us consider a large vessel filled with air and vented to the atmosphere with a small amount of water in the vessel and let us assume that the temperature of the air in the vessel is fixed at, say, 70 degrees, and that the temperature of the water is only 32 degrees. On reference to psychrometric tables we find that the tension of the vapor of water at 32 degrees is .0887 pounds per square inch, and that at 50 degrees, for instance, the pressure is .178 pounds per square inch. If, therefore, we should heat the water in the confined air space from 32 degrees to 50 degrees the tension of the vapor will have been approximately doubled, and according to Dalton's law since the pressure in the vented vessel is constant, the pressure of the air in that vessel must have been reduced by the same amount that the tension of the vapor is increased. Therefore a small corresponding amount of the air will have been forced through the vent so as to equalize with the atmosphere. Correspondingly, if we should raise the temperature of the water to 70 degrees, the vapor tension will have increased to .3628 pounds or approximately four times the pressure at 32 degrees, and we will therefore have forced more vapor into the confined atmosphere by allowing a litle more of the air to escape. It is perfectly obvious that we cannot force any more vapor into the atmosphere by heating the water in the vessel above 70 degrees (the temperature

of the atmosphere in the vessel), because the vapor when heated above the temperature of the air will condense on contact with the air. When the vaporized water, therefore, has reached a temperature of 70 degrees with a vapor pressure of .3628 pounds per square inch it will have saturated the air. On further reference to the tables we find that at 70 degrees the air can hold 8.069 grains of moisture per cubic foot. Therefore when the air was at a temperature of 50 degrees and a vapor pressure of .178 pounds it could only one-half saturate the air, and at 32 degrees when its vapor pressure was .0887 pounds, or about one-fourth the vapor pressure at 70 degrees, it could only one-fourth saturate the air. In table one, taken from standard tables, the relation between the temperature of the air and the grains of moisture which it can hold without saturation, and the temperature and vapor pressure of water, are shown. The very rapid rate of increase in the capacity of the air for holding moisture is due directly to, and is a function of, the very rapid rate at which the pressure or vapor tension of boiling water under partial vacuum increases with the temperature of the water.

TABLE 1

Mixture of air and saturated water vapor

Temp. °F.	Pressure of sat. vapor, lbs. per sq. in.	Wt. of sat. vapor per cu. ft. air, grains
20	0.0594	1.237
30	0.000278	1.943
35	0.1000	2.380
40	0.1217	2.868
45	0.1475	3.442
50	0.1780	4.113
55	0.2140	4.895
60	0.2561	5.804
65	0.3054	6.855
70	0.3628	8.069
75	0.4295	9.46
80	0.5036	11.06
85	0.5955	12.89
90	0.6977	14.96

When the air contains less than the quantity of water vapor which it is possible to force into it without saturation through the vaporization of water in contact with the air, the air is said to be only partially saturated, and the ratio of the vapor which the air actually contains to that which it is possible to force into it without precipitation of fog is known as the relative humidity.

The statistics of the Weather Bureau show that saturation is an unusual condition of the atmosphere and that in most sections of the country a relative humidity of 50 percent approximates the normal condition.

Air at 31 degrees and 50 percent humidity would contain only 1 degree of moisture per cubic foot. If this air were forced into a mine and heated up to the inside temperature of the mine

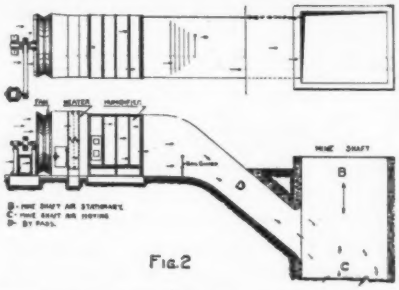


Diagram of general method of admitting conditioned air to shaft mines

(which we will assume to be 70 degrees) the capacity of the air for holding moisture would become 8 grains per cubic foot and the air would then be in position to absorb from the interior surfaces of the mine 7 grains of moisture per cubic foot. In other words, the ventilation of mines, as has been well understood for years, is a drying out process when the temperature of the atmosphere is materially below that of the inside of the mine. It necessarily follows that the drying out may cease altogether during the summer months and increase very rapidly during the fall and winter months.

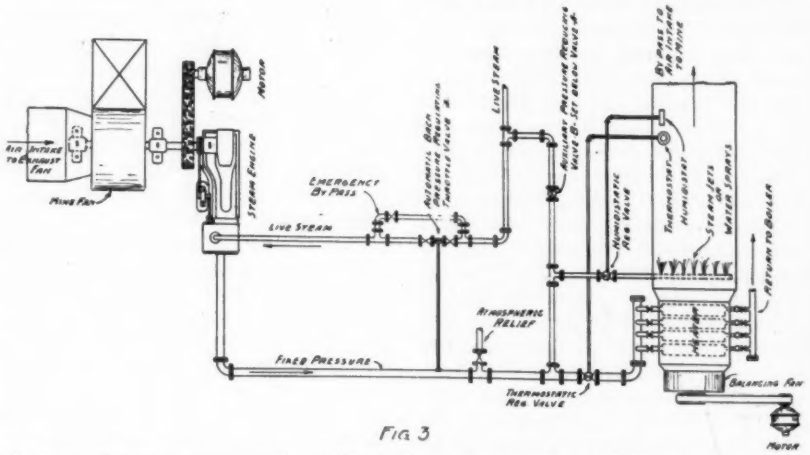
It may readily be calculated that very large quantities of water will be removed from mines during cold weather. For instance, under the atmospheric condition which we have assumed, namely, 31 degrees temperature and 50 percent humidity, with the absorption of 7 grains of moisture per cubic foot, 1/1000 of a pound of water would be removed by every cubic foot of air entering the mine, and with, say, 100,000 cubic feet of air per minute entering the mine, 100 pounds of water per minute, or 72 tons per day, will have been removed. A number of tests have shown that even in the dryest mines, and with the dryest entering air, the air leaves the mine approximately saturated.

In recognition of the foregoing facts a number of expedients have been resorted to for years in an effort to prevent the drying out of mines and the accumulation of dry dust. Some of these means are as follows:

(a) Sprinkling the surfaces of the mines. When the tremendous areas and underground extent of large mines are considered in connection with the inky darkness in which the sprinkling has to be done, the difficulties in having this work done with thoroughness are readily apparent. It is customary to sprinkle more thoroughly the active portions of the mine than the inactive, but it is well known that the carrying power of rapidly moving air is tremendous, as is indicated by the gradual deposition of dust on books in the top stories of the highest office buildings. Then there is the frail human element to depend upon.

(b) Some mines using cutting machines have adopted the ingenious device of building spray heads on the cutter bars in order that the bug dust may be converted into muck. This device is effective in retarding the formation of the large amount of dust, due to undercutting—at its source—but it does not prevent the formation of dust produced by drilling, shooting, loading and haulage through the mine. In fact, some very disastrous explosions in this country have occurred in mines in which there were cutting machines.

(c) A great many mines have resorted to the expedient of admitting low pressure steam into the entering air. It has been known for years that this method is very ineffectual for the reason that in cold weather, when the drying out of the mine is most serious, the amount of moisture which the entering air can absorb without becoming saturated and producing a tremendous fog is so small that the method is of small practical value. When the atmospheric temperature is near the mine temperature the



System of power regeneration with back pressure system of live steam control. Steam humidification

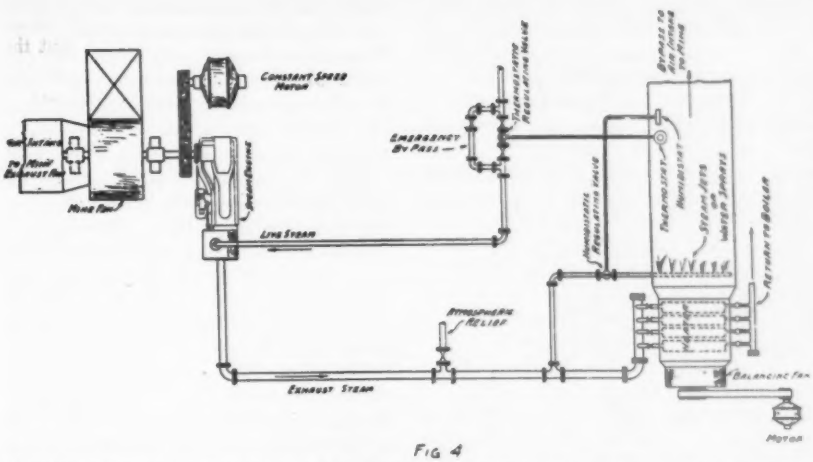


FIG 4

System of power regeneration with thermostatic system of live steam control. Steam humidification

drying out process is no doubt retarded, but under these conditions the drying out process is not serious. It is now generally recognized that the introduction of steam into the workings of a mine without preheating the air is of little value in cold weather.

(d) Some mines have adopted the expedient of preheating the entering air before attempting to saturate it. This method to be successful should involve the following considerations:

(1) All of the air entering the mine should be heated by an automatically controlled plant having a capacity to heat the air to the temperature of the mine through any winter weather which is likely to be maintained for a period of three days or longer.

(2) The plant should have capacity to saturate the air at the mine temperature, and also, as the occasion may demand, to saturate it at temperatures above that of the mine, in order that a controllable deposition may be made on the mine surfaces when the mine is not being worked. There are hours on work days, idle days, holidays and Sundays when this is practicable. By this means the mine may be subjected to a periodic drenching.

(3) On the assumption that the maximum deposition of moisture in the mine will occur on the first half of the mine, which should be the working half of the mine, the mine ventilation should be operated on the exhausting principle.

On the assumption that an ounce of prevention is worth a pound of cure, it would seem that the obviously simple and rational thing to do would be to stop the drying out action of the air by preheating it, and if necessary heating it above the temperature of the mine, and at all events saturating it before it enters the mine. This proposal has the advantage of simplicity and directness, and it should have the same status that preventive medicine in medical science bears to curative medicine. It is obviously wiser to prevent a fever epidemic by destroying the mosquito than by leaving the mosquito unmolested and attempting to combat the ravages of the disease. It is possible and doubtless probable that in many mines sprinkling will be found necessary in addition to the preheating and saturation of the air, but if the safety of thousands of men is dependent upon the surfaces of the mine being kept wet at all times it would seem that every possible means should be employed to this end, and as a supplementary source of safety the preheating and saturation of the air has the great advantage of being on the outside where it may be watched, where its records may be maintained, and where, therefore, the frail human element may be to a large extent eliminated.

There is no escaping the formation of dust in a mine. It is concomitant with the mining and transportation of coal through the mine. That the propagation and deposition of dust is general and gradual in a mine is apparent to anyone who has observed the accumulation of dust in offices 20 or more stories above the street, or who has observed dust fogs suddenly form in clear, dry weather in the fall of the year in industrial cities.

The deposition of dust on the surfaces of a mine is an ever present opportunity for a mine explosion so long as that dust is sufficiently dry to be thrown into suspension in the mine atmosphere in sufficient quantities to form an explosive mixture. The initial explosion or disturbance necessary to throw it into suspension in quantities sufficient for an explosive mixture and to ignite it may never occur during the life of the most dusty mine. When this combination of events does occur, however, even in a mine which is supposed to be thoroughly sprinkled, there is usually a tremendous tragedy. First, there is a local gas explosion due to any of several causes; or there is a windy shot; or there is a detonation of dynamite or powder in the mine; or there is a wreck due to a trip of cars running wild on a slope; or to a collision in the mine, etc. In any of these events should there be a deposit of dry dust on timbers or on the surfaces of the mine contiguous to the initial explosion or wreck, there is a strong probability that the dust may be thrown into suspension in sufficient quantity to constitute an explosive mixture. If under these conditions there is a source of ignition at hand, a dust explosion immediately ensues. The force of this initial dust explosion throws down more dust in its path, and this additional dust furnishes additional fuel necessary to continue the propagation of the original explosion. If there is an intervening section of the mine so well sprinkled that the continuity of the dust formed will be interrupted, the explosion will probably be a local one, otherwise it may be a general explosion.

It is only on the principle that dust explosions are cumulative or self-propagating that we can account for flames hundreds of feet long issuing from slopes or shafts hundreds and sometimes thousands of feet long. It is a very simple matter to prove that the calorific value of the coal dust in the immediate vicinity of the initial explosion is utterly inadequate, unless fed by more dust, to heat to incandescence a column of mine air several thousand feet long.

The fact that every mine operator has to consider is that so long as dust is capable, by an initial explosion or violence, of being thrown into suspension in explosive quantities, his mine is a potential death trap. The extraordinary combination of an initial gas explosion, powder explosion, dynamite explosion, windy shot or wreck, coupled with the possibility of contiguous dust being thrown into suspension in an explosive mixture, may not come during the life of his property, but if it should come, a tremendous funeral for his employes is in prospect. It would therefore seem that as a safety precaution the mine operator should avail himself of the following safeguards:

First. The mine should be operated exhausting and the air entering the mine should at all times be preheated to a temperature not less than that of the mine and saturated at this temperature. By this means the drying out process will cease.

Second. The air entering the mine should be superheated above the tem-

perature of the mine and saturated, during those periods when the mine is not working, and to such an extent as will keep the surfaces of the mine wet. By this means a concurrent deposition or stratification of dust and moisture will take place throughout the mine, and it should therefore be possible to keep the mine surfaces entirely wet. This effect will be greatly enhanced by any dirt which may be present in the coal dust.

These superheated periods will, of course, throw the mine into an impenetrable fog and are, therefore, not practicable while mine is in operation. There are usually, however, hours during working days and nights, Sundays, pay days and holidays when such a process is practicable. The absorptive capacity of air for water vapor, as has been stated, increases so rapidly with the temperature of the air that a very considerable amount of deposition may be effected by heating the air to a comparatively small extent above the temperature of the mine when the mine is not in operation. Thus, when a deposition or stratification of moisture and coal dust is made concurrently day by day there can be no question of the practicability of wetting the mine surfaces, provided a heating and humidifying apparatus of sufficient capacity and of sufficient flexibility of adjustment is provided for this purpose.

Roof Disintegration

We have considered the effect of mine air conditioning upon the formation of dust in the coal mine. It is now interesting to consider the effect which the alternate hydration and dehydration of the mine roof has upon its disintegration.

It is well known that all rocks, after long exposure to atmospheric and climatic changes, will weather and disintegrate—some almost inappreciably through the centuries, but others very rapidly.

Now the three classes of rock of which mine surfaces are usually composed are sandstones, slates and shales. Roofs formed of sandstones weather very slowly from atmospheric changes. Roofs composed of slates and shales are subject to more rapid disintegration. Shales and slates are both clays in which metamorphism has progressed to a varying extent—much greater in the case of slate than of shale. Hard slates are therefore resistant to atmospheric disintegration. Shales, however, are laminated clays of very varying degrees of metamorphism and density, and therefore possess very varying degrees of resistance to atmospheric disintegration. When shale roofs are argilaceous, or clayey, they partake more strongly of the nature of clay and are consequently more subject to atmospheric disintegration. Clay, being a sedimentary substance formed by very slow precipitation in water, is very finely divided and has great capacity for holding water in its interstitial spaces or voids when wet or plastic. Consequently, when clays are dried out they usually undergo very great shrinkage. Some clays are known to shrink one-third in volume on drying out. Instances of this action are very common. Every one, for instance, has observed the cracking up of the surface of a red clay puddle into deep cracks and fissures during the hot summer months when the puddle has rapidly dried out. Mine operators have also witnessed the effect of uncovered steam pipes in mine entries and air ways, upon the roof disintegration of those entries and air ways. In these cases, as is well known, the high temperature of the air at the roof, due to the radiation from the pipe, so greatly increases the capacity of the air for absorbing moisture from the roof, that the roof undergoes constant drying out, shrinkage, and cracking and, as a consequence, rapid disintegration takes place with certain classes of shale or slate roofs.

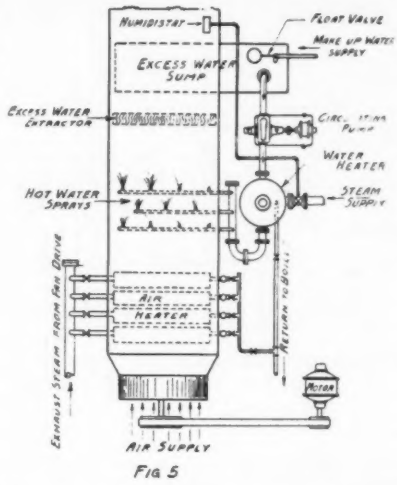


FIG 5

Diagram of humidification by hot water sprays

It is an erroneous belief on the part of many people that the disintegration of the roof in this case is brought about by expansion due to heat, rather than by the drying out and shrinkage of the roof due to heat. Every reinforced concrete engineer, however, knows that long monolithic walls only crack in winter when the temperature is cold and that on hot summer days these cracks close up. It is also well known that a slab or wall under compression, due to temperature rise, will stand considerable temperature rise without cracking or deformation—until the elastic limit of the material is exceeded, or buckling takes place. The effect, therefore, of temperature variations upon mine roofs is exceedingly small, partly also because, except near the mine intake, the temperature variations themselves are very small. But the effect of moisture variations upon the cracking of certain classes of roofs is very great.

Let us consider the condition of a roof during the summer months when the outside air is warmer than the inside air and when, therefore, the inside air is saturated and the mine surfaces are wet. Since most rock is hygroscopic—especially shales and slates—the inherent moisture in the overlying rock will work down through the strata toward the mine surfaces during the summer months. During the winter months, however, when the drying out process in the mine sets in, the moisture will recede upward from the mine surfaces with the result that the mine surfaces will become dried out. This results in a seasonal and periodical contraction and cracking of these surfaces. As these cracks and fissures extend deeper and deeper in the overhead mine rock after successive cycles of wetting and drying, the rock becomes loosened from the roof and falls, thereby exposing new surfaces to disintegration. This process continues so that on the main entries of mines where the drying-out action of the air is greatest, mine roofs have been observed to fall in for a height of 30 to 40 feet. This action is so serious in some sections of the country having shale roofs of an argilaceous character that the cost of timbering is one of the greatest costs of mining.

The report of the United States Bureau of Mines shows that 780 men were killed in the mines of the United States last year from falling rock. It is obvious, of course, that these accidents were not all due to the weathering of the mine roofs. A great many roofs are defective, due to faults, slips, cleavage planes and to disintegration due to infiltration of water. Roofs are also sometimes shattered in shooting. But there is little doubt that much falling of roofs is due to alternate wetting and drying, and can, therefore, be prevented by maintaining the roof constantly in the state of dampness in which nature left it. If the mine air is kept saturated, and thereby incapacitated for drying out the roof, the roof should not disintegrate. This effect could readily be secured by maintaining the incoming mine air always at the temperature of the mine and by precluding the possibility of its absorbing water from the mine roofs by saturating it before it entered the mine.

Introduction of Mine Air

We have discussed the effect of mine air conditioning on dry dust formation and roof disintegration. We are now confronted with the engineering problem of devising ways and means for properly introducing the air into the mine. Every

consideration would point to the desirability of the air being introduced into the workings of the mine—that is, of the mine fan being operated on the exhausting principle. First of all, the deposition of moisture will be greatest on the first half of the mine, assuming the entering air to be preheated above the temperature of the mine and saturated. The deposition of moisture ought to be greatest where it is most needed—namely, in the working places, rather than in the return air ways. Second, if during the winter months the entering air is heated up to the mine temperature, the danger of physical exposure to the men in the mine is eliminated and there is no necessity for forcing the air around through the return air ways to heat the air up. Finally it is not generally safe to operate many mines on the blowing principle for the well understood reasons that gas liberated in the return air courses and working places should not be made to traverse the main haulage ways, and for the further reason that, physiologically, the air entering the working places first, is purer and better for the men themselves.

Inasmuch, therefore, as the exhaust fan system is the correct system for ventilating mines with preheated air, the question arises as to the method by which the air can be heated and humidified without obstructing the slope, drift or shaft haulage way. A simple method to accomplish this result is illustrated on figures 1 and 2 attached herewith. Figure 1 shows the principle applied to a slope or drift and figure 2 to a shaft. The principle involved in the method is general and applies to all classes of mines alike, although the application of the method will be varied to meet the peculiar conditions of each mining operation.

Referring to figure 1, it will be noted that without mine air conditioning facilities the air would normally be sucked into the main haulage way "B," through the mine workings, and thence into the return air course "A" by the mine exhaust fan. If now a diverting by-pass chamber, "D," is connected to the main haulage way "B" at some convenient point, and the mouth of the chamber "D" obstructed with a fan and heater, it is clear that unless the fan is running the normal ventilating air will continue to flow into the unobstructed haulage way "B." If now the balancing or diverting fan "B" discharging into chamber "D" is started running and gradually increased in speed it is apparent that an increasing portion of the air normally flowing in "B" will be diverted into by-pass "D" until when a certain speed of the balancing fan is reached the entire mine air current will be diverted into by-pass "D," and at this point the air in the front portion "B" of the haulage way becomes stationary or balanced. If the speed of the balancing fan is fixed in relation to the exhausting fan at the correct balancing speed, all the mine air can be permanently diverted into chamber "D" where it can be heated and humidified to any desired extent. If the balancing fan should run at any other than the correct speed, either unconditioned air will flow into the haulage way "B," or conditioned air will flow out of it and be wasted.

This latter condition will take place when the slope or shaft is partially obstructed by means of cars or cages.

Power as a By-Product

One of the objections to the operation of a humidifying plant of this kind is the cost of the fuel involved in the operation. It is, therefore, important that ways and means be devised for minimizing the cost of this fuel. The steam required for the purpose of heating and humidifying will generally be in excess of the exhaust steam which will be delivered by the engine or turbine driving the main mine fan.

If, therefore, the mine fan should be equipped with a double drive consisting of an electric motor fed from some electric power source and a steam engine, turbine or other steam motor, and if the steam motor should supply the heater and humidifier with exhaust steam the following results may be obtained:

1st: When no exhaust steam is required, the power may be furnished by the electric motor and the steam motor may be run light.

2nd: When a small amount of exhaust steam is required, the steam may be furnished by the steam motor and the power furnished partly by the electric motor and partly by the steam motor.

3rd: When a large amount of exhaust steam is required for heating and humidifying all the power may be furnished by the steam motor and none by the electric motor, or carrying the step still further, the steam motor may develop more power than is required for driving the fan in supplying the exhaust steam requirements of the heating and humidifying plant and this excess power may be used to drive the motor as a generator and regenerate power.

It can be demonstrated that with a system of this kind the saving in kilowatt hours at prevailing prices for current may be very much greater than the entire cost of steam for the operation of the heater and humidifier.

Another very important point gained by such a system of power regeneration consists in the fact that a double drive would always be available on the mine fan in case of emergency.

A diagram of a regeneration system as applied to a mine fan heater and humidifier is indicated in figures 3 and 4.

Referring to figure 3, it will be noted that both a motor and steam engine are shown driving the mine fan, the amount of live steam admitted to the engine being governed by the pressure in the exhaust line. Moreover, an automatic thermostat located in the air conditioning chamber admits such an amount of exhaust steam to the heater as will maintain the fixed temperature in the chamber for which the thermostat is set, the thermostat and thermostatic regulating valve being standard commercial apparatus.

If, when the automatic back pressure valve "A," in an effort to maintain a constant exhaust pressure, has opened wide, the exhaust steam pressure falls a predetermined amount below the desired fixed pressure, then an auxiliary reducing valve "B" opens and admits live

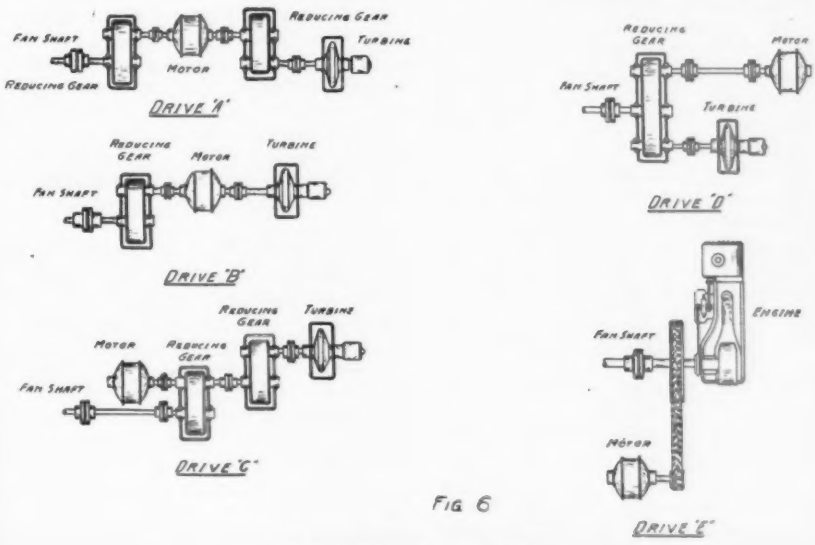


Fig 6

Some double mine fan drives

steam direct to the exhaust steam line.

A modification of the system is also shown in figure No. 4. In this case, as will be noted, the live steam admitted to the engine instead of being respondent to and controlled by the pressure of the exhaust steam, is controlled directly by a thermostatic regulating valve which in turn is respondent directly to the thermostat in the air conditioning chamber. In this way the thermostat automatically maintains the temperature in the chamber constant by admitting the requisite live steam directly to the engine.

In general, either of two methods of humidifying the air may be employed, depending upon local conditions, as follows:

(a) The steam method in which the steam is admitted directly into the air. This method is much simpler mechanically, requires a smaller heater, and hence involves considerably less initial outlay in plant equipment than method "B." In this case the steam may be admitted to the point of visible saturation by hand adjustment. The admission of steam after the air passes through the heater will increase the air temperature several degrees, depending on the final temperature of the air. In this way a comparatively small heater is required.

(b) The water spray method, the elements of which are indicated in figure 5. In this case, warm water is continuously circulated through spray nozzles located in the conditioning chamber, any unevaporated water being collected in a sump and resprayed in connection with such makeup water as is required. The water is heated by a steam heater, and the temperature of the water largely governs the degree of saturation of the air, the water being sprayed in constant amount. The steam supply to the water heater may be adjusted by hand to the point of visible air saturation, or it may be controlled by an automatic humidistat set to maintain a fixed humidity. An advantage of this system is that with it all steam delivered by the boilers is condensed and returned to the boilers, thus eliminating boiler trouble due to bad feed water. This advantage is partially offset by the possibility of corrosion in the water heater by bad make-up water.

Both systems require the same amount of steam from the boilers. With good boiler water the use of the steam system would doubtless be better engineering, while the water spray system might be used with bad water.

In figure 6 are certain suggestions of double fan drives which will be self-explanatory to mechanical engineers.

In general, the use of steam turbines in connection with herringbone gear reducer sets, flexible couplings, and electric motors, will commend themselves for their extreme simplicity and reliability, low first cost, compactness and freedom from oil in the exhaust steam.

In general, a steam turbine with a low water rate will be economical in delivering the maximum possible power as a by-product.

The standby value of the turbine as a guarantee against fan shut-downs is greatly enhanced over oil or gas engine drives through the fact that the turbine remains continuously in operation and hence does not require starting in an emergency.

To sum up then, there is reason to believe that if mine air is conditioned along lines suggested in this paper, in combination with means for regenerating electric power, the following results may be accomplished:

(a) The mine surfaces in very large measure may be maintained continuously and uniformly wet, and, if used with sprinklers on cutting machine bars, very little, if any, additional sprinkling in the mines should be required.

(b) The disintegration of many classes of mine roofs will be retarded.

(c) The exposure and discomfort to men working in the cold air circulation of mines in cold climates will be relieved.

(d) A double drive for the mine fan will be provided in which both sources of motive power are continuously in service.

(e) By the system of regeneration proposed, it may be possible and practicable to automatically recover as a by-product, sufficient electrical energy when electrical power is available, to pay, or more than pay, for the cost of the fuel required for humidification.

WORKMEN'S COMPENSATION

Reviewing workmen's compensation legislation in 1923, the Department of Labor says coal mines are presumptively included under the Tennessee law instead of active election being required.

Coal mines may insure or carry self-insurance or may become members of the Coal Operators' Protective Fund, to be maintained in the State Treasury settlements to be approved by the Labor Commissioner.

In Indiana a mining law provides that in cases of mines with openings in other states whose entries or workings extend into Indiana, the compensation law of the state in which the shaft or opening is located shall prevail.

WAR MINERALS

With 250 cases yet to pass on and approximately $1,900,000 available to meet awards, the War Minerals Relief Commission, by direction of the Secretary of the Interior, is not making awards and payments direct but is examining claims and determining net losses and suspending payments of awards until completion of examination of all claims in order to determine whether the available funds will be sufficient to cover all awards. This action has been taken as a precautionary measure to prevent the department exceeding the appropriation of $8,500,000 made by Congress for settlement of these claims, as the Government is prohibited by law from exceeding an appropriation, and in this case it is specifically stated that the appropriation shall not be exceeded. In case awards in the remaining claims exceed the present balance of appropriations the department may pro-rate the balance of the fund among successful claimants although request may be made for a deficiency appropriation by Congress to satisfy all claims. It is believed, however, that the present appropriation will be more than ample to meet all awards but this precaution is taken to protect those whose claims have not yet been passed on. To date payment of 11 awards has been suspended. Two points in connection with war minerals relief are pending in the courts and if decided in favor of claimants will require the consideration of claims in which these points are involved and which have heretofore been rejected. These cover the matter of the purchase price of property and interest.

COAL COMMITTEE

Representatives of producers, wholesalers and retailers of bituminous coal, and railroads, have adopted the suggestion of Chief Wadleigh, of the Coal Division of the Department of Commerce, for the selection of an advisory committee to cooperate in making the work of this division of value to the coal industry. Mr. Wadleigh has requested each of these interests to select three members to represent them on this committee, and the anthracite industry will be invited to appoint three members, making a committee of 15, with Mr. Wadleigh as chairman.

ANOTHER RAILROAD PROJECT SNAGGED

The Wyoming North and South Railroad Company has been denied a right of way across the Salt Creek oil field of Wyoming by the Interior Department. Reason for the denial of the right of way was based on the fact that the public lands in the Salt Creek field have been reserved and that because of this reservation the law does not sanction the building of a railroad across it. Another ground for the refusal to grant approval was the fact that the railroad might interfere with the development of oil in the field and with the rights of oil lessees.

THE COAL PROBLEM SIMPLIFIED

By George H. Cushing

RECENT discussions, a year's investigation, and the report of the U. S. Coal Commission nave had, at least, the effect of simplifying the coal problem to a point where anybody can now understand it.

An editor of a New York magazine sent an outstanding writer into the coal fields some years ago to answer the question: "Who owns the bituminous coal industry?" The writer returned with the statement, "The trouble is that nobody owns it." From that time forward efforts have been made to establish a responsible owner. The purpose was that management could be personified and hence punished or rewarded—principally punished. In looking over the field to find a possible owner or manager, but three candidates are available. They are:

1—The present body of ten thousand operators supported by four hundred thousand stockholders.

2—The Miners' Union.

3—A series of governmental bureaus acting in federation.

As the operators fight to retain not only the ownership but the management of their mines and as the Miners' Union and the bureaus attempt to install themselves as managers, a nationwide discussion has started. This has given rise to the statement that we have a coal problem. The essence, therefore, of the whole problem is: Which one of these three groups shall, in future, manage the coal mining industry? An intelligent decision by the people demands that we should set up the program or platform upon which each of these groups appeals to the American public.

The operators have never formulated their own platform in a way that it is here to be expressed. Nevertheless, the following is an exact statement of their point of view. They have been asked to come forward with "a constructive program." They have said that to outline in detail what should be done with, by and for the industry from day to day, for an indefinite period, in future, is an impossibility, because no business can be run on schedule. *Therefore, the essence of their proposal is that the people shall rely for their safety upon the play of competitive forces.*

What the operators, in reality, are asking is that the hazards—mental, legal and physical—shall be removed from the path of competition. It would involve too much to go into the details, but one thing will suffice as an illustration. We have a productive capacity in bituminous mines of between 18 million and 20 million tons per week. We have a demand from powerhouses for not to exceed 12 million tons per week. On this basis, we have an excess productive capacity of close to 6 million tons per week. At the same time, we have, occasionally, a shortage of coal at the market. These two statements are contradictory and anomalous. The explanation is that at periods we have an interruption of work, due to strikes, or an interruption of transportation, due to railroad failures. These two things amount to an embargo upon competition. The coal industry says, "Remove these embargoes; allow competition free play; and we will solve the coal problem over night." And that is the program and platform upon which the operators appeal to the people.

The program of the three contenders is before the public. The operators who desire to continue in control propose to solve "the problems" by competition. The miners, if set up in control, propose a monopoly of coal mining in the interest of labor. The bureaus, if set up in control, propose a monopoly by the government, administered in the interest of labor.

The Miners' Union, in asking to be set up as the manager of the industry, comes before the country with a very elaborate program and platform. What it demands of coal is what all the unions in the United States demand of all industry, and what all unions around the world demand of all industry around the world.

Its first demand is that we shall recognize that the worker has a vested right in his job. This means, if you understand it, that the worker insists that he owns the job and may do with it as he pleases. This carries with it the right to work at the job or to leave it alone; to do it efficiently or to manage it inefficiently; and, as in the case of the Herrin disaster, the right, if necessary, *to murder those who trespass upon the job.*

The second plank of the miners' platform is that they shall have a monopoly of the right to labor in all coal mines. Their constitution calls for the grouping in one organization of all workers in and around coal mines on the North American continent.

The third plank in their platform is that they shall receive for their labor the full social value of a ton of coal which, by their convention of 1922, they have interpreted to mean *the selling price, less only the freight rate.*

They have now added the fourth plank in their program which adds to their demand for less work and more pay, a provision for nationwide agreements and nationwide strikes, so they may force their demands upon not only the industry, but upon the consumers.

It is upon this elaborate platform, with monopoly as a base, that the miners are appealing to the people to set them up as the new managers of the industry.

The bureau base their demand for the right to manage the properties also upon an elaborate program. They start out with one declaration, which is that coal is a commodity charged with a public interest. This is a mere shiboleth on which they hope to allow regulation of coal to slide through the Federal Constitution. Their proposal, in essence, is that coal shall be taken out of the list of commodities and put on the list of public utilities. This means that it shall be subject to the same regulation as are all other public utilities. In the end, all regulated public utilities have come to be monopolies. The objective, therefore, of this proposed declaration about coal is that we shall establish a monopoly in it.

The second plank in their platform is that the merchants who do business in interstate commerce shall be licensed. This gives to the licensor the right to change his regulations from day to day, and obliges the licensee to obey those regulations under penalty of having his license canceled and his concern eliminated from business.

The third plank in their bureau program is that the operators of each district shall be not only allowed, but encouraged to consolidate into one large company, and that the consolidations by districts shall not only be allowed, but encouraged to make a division among themselves of the territory in which their coal shall be sold. This, in essence, is the opposite of what the nation sought to do when it passed the Sherman Anti-Trust law.

For fear that these consolidations may be tempted to extend their operations unduly, and then shall be tempted to enter into inter-district competition to a greater extent than the bureaus think

advisable, it is proposed that the Interstate Commerce Commission shall have the right to say when, in the public interest, any new mines shall open.

It is also proposed that the Interstate Commerce Commission shall be empowered so to manipulate freight rates that coals from distant mines may not move into certain markets except under such a freight rate handicap as the people will not pay.

If you understand what it is that the bureaus propose, the picture which their program visualizes is of a bituminous monopoly more powerful than any organization that was ever alleged to exist in the anthracite field. You have a monopoly, then, that has complete control of the whole situation and a monopoly which matches exactly with its production the current needs of the people.

The Bureaus, however, are not content with that. They have expressed themselves in the Coal Commission's report as favoring a gradual extension of the Miners' Union, until that organization shall have a monopoly of the right to labor in the coal mines. Thus, the bureaus propose a monopoly within a monopoly, and, therefore, that the coal industry shall be run in monopoly form in the interest of the Miners' Union. That is the program upon which the bureaus are appealing to the people for the right to manage the coal mines.

With this simple statement, the program of the three contenders is before the public. The operators who desire to continue in control, propose to solve "the problems" by competition. The miners, if set up in control, propose a monopoly of coal mining in the interest of labor. The bureaus, if set up in control, propose a monopoly by the government, administered in the interest of labor. The three programs are thus before the country.

It is for the country to decide which of the three it wants.

Before any intelligent decision can be made by the Congress—to which the whole matter now goes—it must first decide whether it wants or does not want a monopoly of the coal mines. If it does not want such a monopoly, it cannot nationalize the mines as labor demands and it cannot carry out the recommendations of the United States Coal Commission. But, if it does want a monopoly—and hence to repeal the Sherman Anti-Trust Act—it will then have to decide in whose interest that monopoly is to be created, viz, the miners' union or the bureaus.

The choice apparently makes such little difference that it amounts to no choice at all. That is, if the miners' union gets the monopoly it will run the industry to satisfy its own demands, without consulting the wishes of others. If the bureaus get the coal business they will have a monopoly with quasi public control but the business will be administered mainly in the interest of the union—at least if the Coal Commission's plan is carried out.

And, the people will have to decide this question: Under which program will the cost of coal be the lowest—under competition or under monopoly? That is the real "coal problem." All others are subsidiary and of minor importance.

OIL WELL POLLUTION

SOME pollution of coastal waters probably results from oil wells located in or near such waters, in the opinion of the committee made up of representatives of the Department of the Interior through the Bureau of Mines, the American Petroleum Institute and the American Steamship Owners' Association, which recently completed a preliminary report on pollution by oil of the Atlantic and Gulf coast waters of the United States. The escape of oil from the wells is usually taken care of in an efficient manner, although some oil is unavoidably spilled around the derrick floor and vicinity. Oil may also be stored in earthen reservoirs, until more permanent storage is provided, but in general this is true only in the early days of a new field, as the losses from earthen storage prohibit its continued use. In the case of heavy rains, the oil that has been spilled by accident throughout the field, and some oil from the earthen reservoirs, may be washed into the adjacent waters, thus causing considerable pollution.

There are at present several oil fields located very near the Gulf coast and, in fact, wells in some districts have been drilled out in the waters. The only one of these visited by the committee was the Goose Creek field in Texas. This field extends on both sides of the creek, which empties into the Houston ship channel. At the time of the inspection the creek was comparatively clean, although the committee was informed that, in the case of heavy rains and at some other times, large quantities of oil are washed down with the current.

The Galveston Commercial Association made an extended study of the source of pollution along the Galveston beach and came to the conclusion that most of the serious pollution occurred at the time of the opening of the Columbia and West Columbia oil fields and therefore was attributed to this source. These fields are located on the Brazos River, which empties into the Gulf of Mexico some 60 miles southwest of Galveston. It appears that eleven months out of the year the currents along the Gulf coast in this general vicinity are in such a direction as to carry the discharge waters from the Brazos River close inshore at Galveston. The country drained by this river is subjected to heavy floods, and it is reliably reported that, within a day and a half after these occur, the water along the Galveston beach exhibits a distinctly reddish tinge characteristic of the Brazos storm waters. This source of pollution is stated to have been considerably abated after proper precautions against the spilling and wastage of oil in these fields had been adopted.

It is difficult, if not impossible, to determine to what extent such oil fields are responsible for oil pollution in coastal waters. The comparatively rare occurrence of such fields along the Atlantic and Gulf Coasts leads to the belief that they are of very minor importance as a general source of oil pollution.

COAL WAGES

A report of the Coal Commission on wage rates in the bituminous industry from 1912 to 1923 gives the percentage of strength of the union in various coal regions as follows: Alabama, 2.2; Arkansas, Oklahoma and Texas, 33.1; Colorado and New Mexico, 2.6; Illinois, 87.5; Indiana, 73.6; Iowa, 88; Kansas, 85.7; Kentucky, Tennessee and Virginia, 20.6; West Virginia, 22.4; Michigan, 80.2; Missouri, 61.4; Montana, 88.6; Ohio, 76.5; Pennsylvania, 41.4; Washington, 9.9; and Wyoming and Utah, 54.4. As compared with 1921, the union lost in all areas except Indiana, where it gained .6 percent; Kansas, where it gained 66.7, and Pennsylvania, where it gained 12.4 percent.

COAL TRADE CONDITIONS

The deplorable coal trade conditions at Hampton Roads are having a bad influence on the coal trade of the entire world. There is a large tonnage of coal at Tidewater ports on demurrage and buyers, usually purchasing their supplies at other ports, find it to their interest to take advantage of the distress coal at Norfolk and are purchasing at prices which net the producer back at the mines a distinct loss. This condition not only reflects back on the home ports but is giving the British a jolt, who are forced to curtail prices on their Welch coals to hold their export trade.

OUR OIL SHALE INDUSTRY

Vast Area of Oil Shale Lands in Colorado, Utah and Wyoming Promise To Meet All Increased Demands for Oil—Oil Produced From These Shales Has Proved To Be Equal, If Not Superior, to Highest Grade Petroleum

By Hon. Lawrence C. Phipps
United States Senator from Colorado

DURING the past few years, and ever since general attention was called to the possibility of developing the oil shale deposits of the west, particularly those of Colorado and Utah, the writer has endeavored to keep in touch with the march of progress and to note the results of the investigations which have been made to determine the areas of shale lands that are oil bearing, the possible yield of oil per acre, together with the by-products, such as ammonium sulphate, which may be recovered through the process of reduction.

To one who has not made a visit to these extensive fields, it would be a difficult matter to convey a real understanding of the vast extent of territory and the geological strata which contain the oil-bearing shales. Were it not for the unusual manner in which the action of the elements, through the water courses and the process of erosion, has cut through the original formations, it would not have been possible for me to realize, even after three or four visits to the various sections of these deposits, how extensive and important they are.

The area of these oil shale lands in Colorado alone amounts in round figures to 900,000 acres, while that of Utah is approximately three times as extensive, although the quality of shale is not so rich and will perhaps yield only about one-fifth of the quantity of oil per acre that may be counted upon from the Colorado fields. The State of Wyoming also has about half a million acres of oil shale lands, but so far as present investigation has determined, the yield of oil per acre will only average 6,000 barrels, as against 15,000 barrels per acre for the Utah lands, and 75,000 barrels per acre for those in Colorado.

Taking this rate of production for Colorado alone, we have a reserve of about 67,500,000,000 barrels of oil; for Utah, 40,500,000,000 barrels; and for Wyoming, 3,000,000,000 barrels. While the figure for Colorado production may appear optimistic, attention is called to the fact that careful sampling of twelve beds of workable thickness in the Parachute Canon District indicated a yield of 185,000 barrels per acre as against the estimate of 75,000 barrels, which has been used in the above figures for Colorado reserves.

These figures should be contrasted with the estimate made about one year ago by the United States Geological Survey on the reserve of petroleum underground, recoverable by current production methods, which was given as 9,150,000,000 barrels.

In what is believed to be the most desirable section of the Parachute District

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Lawrence C. Phipps

of Colorado, the government has set aside as a naval reserve 45,444 acres of oil shale lands.

The oil produced from shales has proved to be at least equal if not superior to the highest grade of petroleum obtained from wells; and in addition to the usual by-products which may be recovered from same in the process of refining, there will be a by-product over and above that secured from petroleum in the form of ammonium sulphate, to the amount of almost 800 tons per acre, or about 700,000,000 that may be obtained from the Colorado fields alone. There is no question but that this material will be in great and increasing demand as a fertilizer.

The operation of shale mining in these deposits will be comparatively simple, because the measures lie almost horizontally and are thick enough to furnish plenty of head-room. The water courses have cut numerous canyons, with many jutting points, exposing the shale on their walls or slopes, and thus affording favorable places for mining operations. The elevation of the shale beds above the valley floors affords plenty of dump room for refuse and also favorable loading facilities. The valleys offer suitable sites for the building of plants and camps at elevations such as to admit of continuous operations through all seasons of the year.

The Colorado fields are so situated as to have a sufficient supply of water for mining and retorting uses and are conveniently located near a main line railroad. They are also accessible to communities where all classes of supplies and labor are available.

It has been estimated that, up to the present time, at least $2,000,000 has been expended in the development of shale lands, on assessment work or purchase, and the building and operation of experimental reduction plants. When it becomes possible to operate successfully large plants in the reduction of these shales, it is conservative to say that the Colorado deposits may yield 250,000 barrels of oil daily and would give employment to a very large number of men.

At the present time, the oil wells of the United States are yielding at a sufficient rate to supply the demands of domestic consumption, and it is perhaps true that our exports are about offset by the quantity of foreign oil which we are purchasing. However, it is interesting to note that in the year 1914 our output amounted to only 266,000,000 barrels, which just about filled our own requirements, whereas in the year 1918, we used about 60,000,000 barrels more than we produced, and were behind in production to about the same extent during the three following years.

In 1922, our domestic production amounted to 550,000,000 barrels and our estimated consumption was 582,000,000 barrels, still indicating a shortage of production. During the current year, however, we are evidently in position to produce much larger quantities than are needed for our own use. But we are undoubtedly draining the natural reser-

vcirs of this important product, and with increasing demands, it may be only a comparatively short time until we will be compelled to turn elsewhere in order to meet our requirements.

While it is possible that new and large producing oil fields may be discovered, it is more than probable that, within the next decade, we shall have to rely upon the refining of oil from the shales, in order to supply the increased demands for oil.

The question of needed resurveys of oil shale lands is one which has had my particular attention during the past year. I believe it to be of prime importance. Many costly disputes would come before the courts and the government departments because of defective surveys involving homesteads, mineral entries and oil leases.

Certainly, everything possible should be done at this time to avoid future conflicts among claimants. A dollar expended on resurveys now may save thousands later.

My research into the matter, with special reference to oil shale lands in western Colorado and eastern Utah, developed a startling condition. This territory was platted many years ago under the old contract system, subsequently abandoned. Many of the surveys were decidedly defective or the monuments obliterated by time, so that claimants cannot comply with the legal requirement that all land entries be made to conform to the subdivisions of the public land surveys. The work was done over forty years ago. Where corners have been found on the outskirts, they were so out of relative position as to make it impossible to restore any of the intervening lost corners to their proper places.

In other words, "patchwork" would not do. The resurvey of a single township, or even a small number of townships, would not accomplish the desired result. Such work can ordinarily be done, upon the request of actual settlers, out of the general appropriation made by Congress for the purpose. But more than this was needed in the case of the valuable oil shale lands in question; and it was apparent that specific mention of the matter should be included in the Interior Department appropriation bill for the current fiscal year.

The Senate increased the amount of the general appropriation for resurveys throughout the country in the sum of $49,600; and, with the assistance of Senator Nicholson and other western legislators, I then succeeded in putting through an amendment to the effect that, out of this general fund, $50,000 might be used for the survey and resurvey of public lands considered valuable for oil and oil shale. The bill, including this item, was signed by the late President Harding on January 24, 1923, and the work is now under way. In this connection, Secretary Work and other Interior Department officials have shown every disposition to be helpful.

Possibly I have over-emphasized the importance of this phase of the work, but I do not think so. This is what the Commissioner of the General Land Office says:

"To attempt to place any reliance in the making of oil developments upon surveys shown by competent evidence to be grossly erroneous, fraudulent, or obliterated will only result in confusion, disorder and discouragement. A resurvey is the only solution, as definite boundaries must necessarily attend developments of a valuable and permanent character."

Aside from the value of the work itself, there is another feature. Small as the amount in question may appear to be, it constitutes substantial recognition by the Congress of an industry which is still in the experimental stage. The national legislature has evinced a real desire to be helpful, and I believe that the feeling of security which will result from a dependable resurvey of these lands will fully justify the expenditure.

As always in the history of our country, there are men who have the ability, foresight and courage to risk their time and money in the development of new industries. It seems to me that the pioneers who have devoted their time and resources in an effort to develop a new industry in the United States are not only entitled to the praise and thanks of their fellow citizens but should be offered all possible encouragement in the important enterprise in which they are engaged.

METAL MINING IN WASHINGTON IN 1923

The mines of Washington showed a decided increase in production during the first half of 1923, according to a statement issued by the Department of the Interior based on statistics compiled by C N. Gerry, of the Geological Survey. The value of the metal output in 1922 was $580,808, an increase from $332,313 in 1921. The high prices of metal led to the shipment of much more siliceous gold ore, lead ore and zinc ore, but the output of copper ore was below normal. In 1922, forty-six mines produced $186,965 in gold, 205,046 ounces of silver, 317,203 pounds of copper, 1,381,199 pounds of lead and 1,228,229 pounds of recoverable zinc. The value of the output, however, is still below the average yearly output of the last decade, which is more than $1,000,000.

The present conditions indicate that the output of gold in 1923 will be decidedly increased. In Whatcom County the amalgamation mill of the Boundary Red Mountain property was active in treating free gold ore, and it was planned to increase the capacity of the mill. An important feature was the large increase in shipments of gold ore from Republic, in Ferry County. The output has been small in recent years, but monthly shipments averaged more than 2,000 tons in the first part of 1923, against 755 tons a month in 1922. The Last Chance, Knob Hill, Surprise and Quilp mines were regular producers. The Last Chance mine was producing about 1,000 tons a month after having been idle several years. Operations were resumed at the First Thought mine, an old producer of gold near Orient, Stevens County. In June, ore was being shipped for smelting, and a large mill to be equipped for amalgamation and cyanidation was planned.

The production of silver in Washington, which has also been far below normal in recent years, shows no increase in the early part of 1923 in spite of the Pittman price. Silver from siliceous ore has increased, but that from copper ore has been decidedly small. Shipments from the Ruby mine, at Oroville, and the Old Dominion, near Colville, have decreased, but rich silver ore was said to have been opened at the Daisy mine, in the Summit district, Stevens County.

The United Silver Copper Company, at Chewelah, has been the main producer of copper in Washington, but recent shipments of about 120 tons a month are far below normal. The Sunset Mines Company, in Snohomish County, was idle in 1922, but shipments of copper concentrate that were resumed in April may offset the decrease in copper from other sources. Despite the fact that the Electric Point Mining Company made no shipments, the output of lead will probably be greater on account of shipments from the Gladstone Mountain mine, near Northport. Early in 1923, the company was marketing a very high grade lead ore at the rate of about 350 tons a month. Concentrates were also shipped from the Cleveland mine, west of Springdale, and from the Bead Lake mine, in Newpost district, Pend Oreille County.

Shipments of zinc ore from the Washington-Black Rock mine were also greatly increased early in 1923.

No dividends from Washington mines were published.

STANDARDIZATION OF METAL MINE VENTILATION FROM THE STANDPOINT OF THE MANUFACTURER

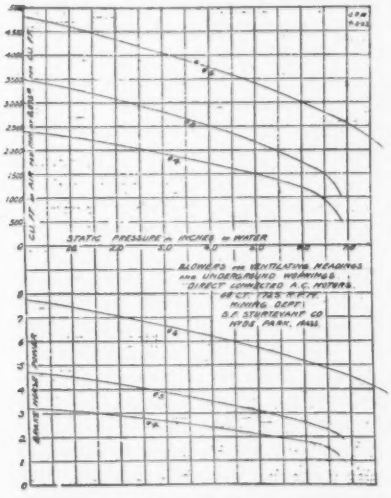
By E. B. Williams

Manager Mine Department, B. F. Sturtevant Co.

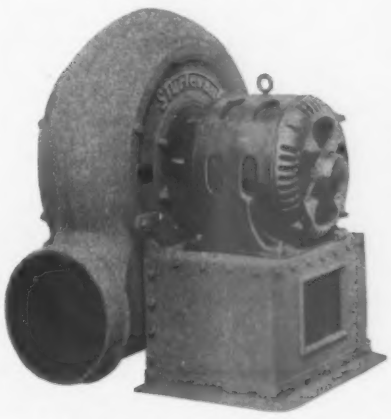
FANS for ventilation of metal mines can be divided into two classes, one including the larger capacity fans running around 50,000 to 300,000 CFM capacity and which are generally installed on the surface, while the other class would include the smaller fans, such as used underground for ventilation of headings and general purposes.

Large Fans—Surface Installation

These large fans seem to invariably run into special installation arrangements depending upon the lay of the ground where they are to be installed, type of driving element, different arrangements of connecting the driving element to the fan, and different duties to be performed. Some fans are single intake, while others are double intake; some blow into the mine at all times, some exhaust at all times, and again others are of the reversible type, all requiring an extensive system of airways, dampers, etc. Some have overhung fan wheels, others have the wheel supported between two bearings. Some are direct connected to the driver, others are driven by chains, etc. Some discharge their air up, others down, and others in the horizontal direction. With



all these variables, and because of these large fans involving so much material, it becomes a very hard matter to standardize. In general, each proposition as it comes up is gone over thoroughly and all of these variable elements worked down to a definite requirement, so that the fan manufacturer can make his bid



on a fan which suits all the various conditions.

Small Fans—Underground Installation

The small fans used for ventilation of headings and underground workings seem to lend themselves very well to the proposition of standardization. Since most of these fans are driven by means of alternating current induction motors, we will confine ourselves to that method of drive. In general, it can be said that the alternating current used in the mines will be either 25 cycles or 60 cycles. Motor frames can also be selected for the fans, so that for a given cycle and horsepower capacity, one frame will be used, the same being wound for 220, 440 or 550 volts and either 2 or 3 phase as required. That is to say, a given fan can be designed with its motor base so that it will accommodate mounting a given motor frame wound for any of the above conditions.

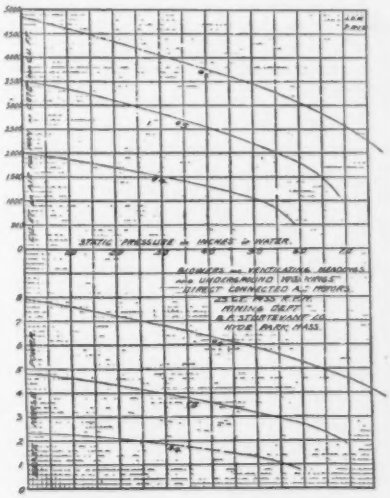
In this service, a motor must, of course, be well protected against rather hard usage, dampness, dirt, etc., and our first thought might be of an enclosed motor. This type in an A. C. motor, however, is not a general standard on the market because, in the first place, the squirrel cage type induction motor has no sliding electrical contacts and it has an almost indestructible rotor, generally of solid aluminum casting. Moreover, the so-called open type squirrel cage induction motors have end shields or bearing headings which are almost totally enclosed. That is to say, the openings in these end covers are very small indeed and, therefore, all rotating parts are very thoroughly protected against mechanical injury due to foreign substances dropping into them. With direct current motor, this argument would, of course, not hold.

Motor manufacturers today put out a line based on 40° C. rise when operating at full load, also another line based on 50° C. rise at full load. For mine service, it is thought the 40° motor should be adhered to as a general proposition.

Taking into consideration the various diameters of ventilating pipes in general use in the mines, and the volume of air required, we can cover this small fan field with about three sizes of fans, making six combinations in all for 25-cycle and 60-cycle work. Since the fans are of the convertible type, the direction of discharge can be swung around to any position desired by means of taking out two or three bolts. A cut of this convertible fan is here shown.

The table on page 408 gives the various duties which these three fans could perform. The length of the ventilating pipe which they could handle as a maximum is given in one of the columns and beyond that length another fan would be installed as a booster, so that in very long systems 2 or 3 fans might be used.

The performance of the three sizes of fans with 25-cycle and 60-cycle motor will be found in two sheets of curves



as shown. These curves show the static pressure or resistance in inches of water which the fans will overcome and the horsepower which will be required when delivering different volumes of air in cubic feet per minute at sea level.

The question which probably now comes to mind is just what would be the

60 CYCLES

CFM	Duty Diam. pipe	Length pipe	Resistance inches water	BHP	RPM	Size Monogram fan	Type	Motor Rated HP	Unit Wt.
500	8″	1,200	6.9	1.0	1,725	4	Open 40°	3	420
1,000	10″	950	6.5	1.6	1,725				
1,500	12″	1,000	6.5	2.4	1,725	5	Open 40°	5	560
2,000	14″	1,000	5.25	2.9	1,725				
3,000	16″	1,000	6.0	5.1	1,725	6	Open 50°	7½	830

25 CYCLES

500	8″	1,000	5.9	.9	1,435	4	Open 40°	3	450
1,000	10″	850	5.2	1.3	1,435				
1,500	12″	1,000	6.5	2.4	1,435	5	Open 40°	5	640
2,000	14″	1,000	5.5	2.9	1,435				
3,000	16″	1,000	6.0	5.1	1,435	6	Open 40°	7½	870

procedure in using this data on some case which might come up in the field. My suggestion would be that we take formula No. 1 in the illustrated chart, which is a formula for resistance of a length of air duct and has the form—

$$\text{Res.} = \frac{L}{29.8} \cdot \frac{Q^2}{D^5 \times 1000^2} \cdot d$$

Where—

L=Length pipe in feet.
Q=CFM.
d=Weight 1 cu. ft. air lbs.
D=Diam. pipe feet.

We can calculate the resistance for different diameters of pipe assuming some certain density of air, for instance, sea level, and thereby simplify the formula to the following:

$$\text{Res.} = \frac{L}{K} \cdot Q^2$$

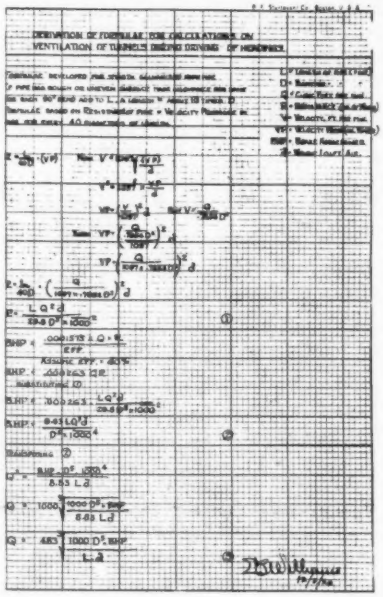
where K is a constant depending on the size pipe. These constants are as follows:

Size Pipe

8 inch. 52.3×1000^2
10 " 160×1000^2
12 " 397×1000^2
14 " 857×1000^2
16 " 1675×1000^2

The fan performance curves are based on standard density at sea level, so it would be well to work out a resistance which the air pipe would have if it were at sea level. The mining engineer will know from his particular problem the approximate length and cubic feet per minute desired, and can calculate the resistance for different sizes of pipe and select any size of pipe best suited to his condition. He could then go to the performance curve of the fan above referred to and find the size fan necessary. The fact that he might be working at an elevation considerably above sea level would simply mean that in the actual installation he would obtain the volume taken from the performance curve, but it would of course be at the lesser density, caused by the altitude, and this would in turn reduce the resistance in inches of water and horsepower in the same proportion which the density bears to sea level density. This would not be objectionable, since it would tend to reduce the load slightly on the motor, and on the other hand the motor does not exactly become underloaded with this condition, since its capacity decreases to some extent with altitude, and therefore the fan load and the motor capacity in a way run along hand in hand with different altitudes.

In the selection of these fans, the manufacturer is considerably restricted or limited by the fact that he must hold to standard alternating current motor speeds. This has required special consideration in the design of fan wheels placed in the standard size fan casings, yet while these fan wheels are not of the exact dimensions or proportions of standard pulley driven fans, they can be considered as standards for metal mine ventilation work, and readily carried as spares, if desired. The motor frames have been selected so as to have sufficient capacity to take care of driving fans on considerably shorter lengths of pipe than the maximum lengths stated in the table. That is to say, the rated horsepower of the motor will be seen to be considerably more than the horsepower required by the fan when delivering air through the maximum length of pipe given in the table. As the length of the pipe is decreased, the fan delivers a greater volume of air and requires more horsepower, all of which is taken care of by the selection of the larger horsepower rating motor.



Derivation of formulae for calculations on ventilation of tunnels during driving of headings

METAL REPORT

Mining of iron and of all the important non-ferrous metals continues to be maintained at a high level, although the output of iron, lead and zinc was slightly smaller in August than in July. Copper production amounted to 129,377,000 pounds in August, which was 3 percent larger than in July and was also larger than in any month during the past four years. The price of refined electrolytic copper at New York declined from 14 cents on August 21 to 13.25 cents on September 19 as a result of the large mine output and imports and the slackening demand. Substantial orders have been received from Japan since the earthquake, but domestic buyers are hesitant. The reason for the present low price of copper is the small margin of exports over imports, whereas prior to the war about one-half the American mine output was consumed in foreign countries. American consumption has been large during 1923, but it is not probable that there will be any permanent increase in the price until foreign demand becomes substantially larger.

Production of lead and zinc declined 3.7 percent and 3.3 percent, respectively, in August. The price of prime western zinc declined slightly in September, while quotations for common lead continued firm. Shipments of slab zinc were smaller in August than in July, and stocks showed a further accumulation. Joplin producers state that they have about 50 000 tons of zinc ore in bins, while the supply of lead ore is practically negligible. In order to prevent over-production zinc mines in that section will close for one week during October. The price of silver advanced in September, due to larger Indian purchases and the fact that August mine output of 5,293,000 ounces was 2 percent less than July production.

REVENUE BUREAU CHANGES CAUSE SPECULATION

Commissioner Blair's Efforts To Improve and Simplify Procedure a Sizable Task—Wisdom Of Abolishing Natural Resources Division Questioned

THE Bureau of Internal Revenue has been subjected to much criticism on account of the many difficulties that taxpayers have encountered in the adjustment of their tax liabilities. The Income Tax Unit, which is perhaps the largest institution of its kind in the world, has been confronted with a task of great magnitude, and the performance of this task has not been wholly satisfactory to the growing millions of American taxpayers. But the work has had to go on, and the complex problems involved in the administration of the income and profits tax laws, coupled with the obstacles which have had to be surmounted in securing training and maintaining the vast personnel, have presented a sizable job for the Commissioner of Internal Revenue upon whom the heaviest responsibility rests.

Commissioner of Internal Revenue David H. Blair has not shirked responsibility. He has proceeded carefully, even slowly, in initiating changes in personnel, organization, and procedure; but wherever it has seemed to him that improvements could be made which would secure greater efficiency and at the same time simplify matters for taxpayers, he has acted. There may be doubt in the minds of some as to whether he has acted wisely in all cases of administrative changes, but there can be no question as to his intent to serve the taxpayers as well as the government in reorganizing the income tax unit and in amending rules of procedure.

Only recently a reorganization took place which involved the abolishment of the Natural Resources Division and the creation of two new divisions which were designated the Engineering Division and the Natural Resources Audit Division, thus dividing the functions of the division abolished.

The reasons for this change have not been made public. So far as is known outside of the department, no responsible representative of the natural resources industries had made any serious complaint about the manner in which the Natural Resources Division was functioning at the time the change was made. So far as is known no responsible representative of any branch of the natural resources industries was even consulted.

The commissioner, of course, can conduct the affairs of his office without consulting taxpayers; but there is a suspicion that he was misinformed concerning the Natural Resources Division. It is a well-known fact that many complaints have emanated from persons who had failed inexcusably in the preparation and presentation of the evidence necessary to a proper determination of their claims. It is also a fact, fully appreciated by taxpayers and tax practitioners in daily contact with the income tax unit, that nowhere else in the unit could there be found officials or employes more highly qualified and more uniformly courteous than in the Natural Resources Division.

David H. Blair, Commissioner of Internal Revenue

If revenue auditors without previous practical experience in mine accounting, without familiarity with mining conditions and mining peculiarities, and without any knowledge of mining terms, are assigned to the Natural Resources Audit Division to replace or supervise men with these qualifications, the change certainly will not serve the best interests of either the government or the taxpayers. The same considerations with respect to mining apply also to lumbering enterprises.

Just now the work is proceeding without any outward indication of impairment; but taxpayers will look askance at the whole matter until the wisdom of the change has been demonstrated. Heretofore, taxpayers have been able to come to Washington and secure conferences on both audit and valuation questions without meeting with delays generally incident to the transfer of cases from one division to another. Unless the two new divisions cooperate closely and without friction, taxpayers engaged in the natural resource industries will not have this advantage in the future, and will be subjected to great expense as the result of holding separate conferences at different times.

The amortization section of the consolidated returns audit division has been abolished. The engineering personnel of that section has been transferred to the appraisal section, engineering division. A statement issued by the Bureau of Internal Revenue says that the engineering work of the income tax unit is now disassociated from the audit work and can be carried on more economically.

Other phases of the reorganization of the income tax unit are believed to be advantageous, since they were designed to effect a closer coordination of the work, and do not complicate the procedure and increase the physical transfer of cases.

The beneficial effects of some of the recent changes in procedure are obvious. For example, the new procedure ordered in connection with reports of revenue agents as the result of their examina-

tion of the books and records of taxpayers for the purpose of verifying income tax returns and statements submitted therewith, will save taxpayers many expensive trips to Washington. The commissioner has ordered revenue agents in charge of the 34 field divisions into which the United States is divided to forward copies of reports on field examinations to the taxpayers, giving taxpayers twenty days within which to protest or file additional information, and an opportunity for oral conferences with the revenue agent in charge, before these field reports are transmitted to the bureau in Washington.

If a taxpayer files an answer in the form of a protest, brief, letter, or other evidence, the revenue agent in charge is now required to examine the same before forwarding all papers to Washington for final audit, and if he finds there is material variance as to statements of fact, he may order a reinvestigation. This will have a tendency to cause field examiners to exercise greater care in making examinations, and will save taxpayers much time and trouble and expense in having minor adjustments and disputes cleared up before final audit is made by the income tax unit. It will also tend to prevent unnecessary duplication of work and arbitrary assessments, and thus will materially simplify many problems of administration.

The whole trend of administrative changes which have been made by Commissioner Blair during the last two years have been toward better coordination of the work of the income tax unit. The other five units of the Bureau of Internal Revenue also have undergone many changes, but none so comprehensive or far-reaching in their effects as those which have shaken, shifted, dissolved or merged the divisions of the income tax unit.

The experiment in decentralization by sending sub-committees of the Committee on Appeals and Review to hear appeals at St. Paul, Los Angeles and Portland, has not reached a stage where its success or failure can be determined. The fact is that thousands of war-time cases are unsettled. They are unsettled because some doubt exists upon which the Bureau can not reach immediately a final conclusion. Many thousands more have not been settled satisfactorily, but the great expense and roundabout methods of procedure involved in appeals to the federal courts have kept taxpayers from appealing many cases in which relief otherwise might be obtained. Decentralization of the appeals committee, it is believed, saves taxpayers whose cases are heard in the field much time and expense, and also affords a more favorable opportunity for the presentation of evidence.

The 26th Annual Convention of the American Mining Congress reiterated its recommendation for a tax settlement board or tax court of appeals independent of the Bureau, by which tax cases could be reviewed on appeal before payment of assessments in dispute and before final disposition of any claim for credit or refund. Taxpayers have no alternative under the present law but to accept the decision of the Bureau, pay whatever tax is finally assessed, and by long-drawn-out process to appeal to the federal courts for relief. In many instances their cases would present an entirely different aspect if payment could be withheld pending final determination of the questions involved, and a tax court of appeals would serve not only the ends of justice, not merely the interests of taxpayers, but would serve to expedite decisions on appealed cases and would relieve the Commissioner of the responsibility of being both prosecutor and trial judge and the final arbiter on appeals from his original decisions in the income-tax unit.

> *"Disputed items and apparent errors and omissions should be adjusted while there is convenient opportunity for necessary conferences with taxpayers.* * * * * * *
>
> *"Audits of returns by the government are now duplicated in many instances due to the system of preliminary audits, by the field division, and audits and re-audits by the various unit audit sections.* * * *"
>
> [Mining Congress Journal, Oct., 1921]

MINERAL ROYALTIES

Bonuses, royalties, and rentals from coal, oil, and gas leases on public lands during the year ended June 30, 1923, have been distributed to five states by the Department of the Interior.

Receipts from Colorado amounted to a total of $22,325.16 of which the state is entitled to 37½ percent or $8,371.94.

Receipts from Louisiana totaled $22.32, the 37½ percent due the state being $8.37.

Receipts from New Mexico were $2,307.19, of which the state is entitled to 37½ percent or $865.20.

Receipts from South Dakota were only $87.51 of which the state's share at 37½ percent amounted to $32.82.

COMPANY REPORT

The official semi-annual report of the American Smelting and Refining Company, for the period ended June 30, 1923, has just been issued to the company's stockholders.

After deducting all bond interest, depreciation or depletion, taxes (including estimated Federal taxes) and miscellaneous adjustments, there was a net income of $5,096,045.58, an increase of $3,270,122.20 over the same period for last year.

As the preferred stock dividends for each six months amount to $1,750,000, there was left available for dividends upon the common stock $3,346,045.58, an earning for the six months' period of $5.48, or at the rate of nearly $11 per annum, per share of common stock. In view of this showing, the board of directors, in June, decided to resume dividends upon the common stock at the rate of 5 percent per annum, the first quarterly dividend of 1¼ percent being payable on the first of August.

There have been no bank loans this year and there was on hand at the end of the period, in cash or securities immediately convertible into cash, $18,658,183.37.

The report presents detailed figures showing the company's position at the end of the first six months of 1923 compared to 1922, as follows:

	Jan. 1-June 30 1923	Increase over same period of 1922
Net earnings operating properties	$10,487,226.08	$4,393,689.11
Other income	241,145.85	73,830.10
Net earnings before taxes, expenses, etc.	10,728,371.93	4,467,519.21
Less:		
Administrative expenses, etc.	702,797.75	172,101.34
Corporate taxes	802,928.76	516,706.35
Interest	1,146,315.51	259,215.10
Depreciation, obsolescence	2,907,545.66	681,729.77
Misc. adjustments	72,738.67	*432,346.55
Net Income	$5,096,045.58	$3,270,122.20

*Decrease.

The Linde Air Products Company, of New York, recently started continuous operations in its new plant at Tulsa, Okla. Oxygen will be extracted from the air by the liquefaction process. The plant is also able to reclaim the nitrogen and separate the rare gases, argon and neon. C. A. Kennedy is operating superintendent.

A Prest-O-Lite plant, for manufacture of welding and cutting gas, is also planned for the same locality.

A REVIEW OF THE LEGISLATIVE OUTLOOK

Coal Regulation, Transportation Conditions, and International Relations Principal Problems for Congressional Attention—Soldier Bonus Possibility—Public Demands Constructive Policies

By McK. W. Kriegh,
Staff American Mining Congress

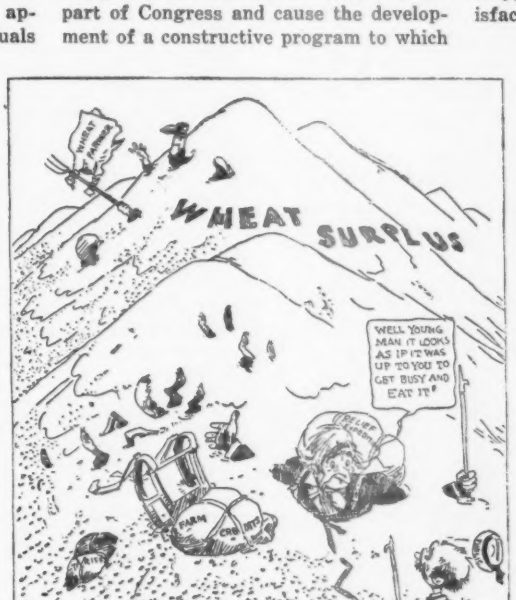
MANY important public questions vie with each other for special consideration as the time approaches for the Sixty-eighth Congress to assemble. All sections of the country are interested in the coal situation and in transportation conditions. The viewpoint of the American public regarding these subjects is finding expression everywhere. The trend of this expression is toward conservative policies; but an occasional outburst appears here and there from individuals and groups who favor drastic governmental regulation, if not nationalization, of the coal industry and the railroads.

International relations, taxation, immigration, silver and gold problems, the soldiers' bonus, Muscle Shoals development, agricultural relief, prohibition enforcement, departmental reorganization, civil service reclassification, and a host of other matters of more or less importance, are being discussed by senators and representatives who have already arrived in the National Capital, and by administrative officials who will be called upon for reports and recommendations from which legislative policies will be evolved.

Coal

Coal still occupies the center of the stage for early legislative attention and as a subject for official and private discussion. The recommendations of the Coal Commission are being carefully studied by President Coolidge and his advisors as well as by representatives of the coal industry. An under-current of sentiment is gaining strength that some of these recommendations are fundamentally unsound. Conservative leaders of economic and political thought are not urging Congress to tread new paths in seeking a solution for coal problems without first determining beyond all doubt that the plans proposed are feasible and fairly workable.

The coal industry has been severely arraigned by its enemies. It has lost many of its friends. Certain interests are striving to magnify its past mistakes and at the same time are attempting to minimize present conditions and circumstances which are in its favor. Washington, for some time to come, will be the headquarters of interests whose purpose unquestionably will be to stampede Congress into the adoption of a drastic policy toward the coal industry. Nevertheless, the fact that the future of the coal industry is so closely interwoven with the future economic welfare of the nation should prevent hasty and ill-considered action on the part of Congress and cause the development of a constructive program to which the American public can safely subscribe.



From Baltimore Sun

Transportation

Closely allied to the problems of the coal industry are the problems of transportation. Railroad strikes, car shortages, high freight rates, lack of storage facilities and other factors of relative importance in the transportation of coal have contributed to the difficulties which have confronted the coal industry. Miners' strikes and the seasonal overloading of railroad facilities following the settlement of these strikes have thrown transportation machinery out of line, and thus have disrupted the movement of all other commodities.

Both separate and joint conferences are being held by railroaders, shippers and consumers for the purpose of evolving principles and policies which should govern in dealing with railroad affairs. So far as the Transportation Act is concerned, sentiment is rapidly crystallizing in favor of a hands-off policy until the success or failure of the act has been demonstrated. Recently the railroad situation has improved very noticeably, and many of the causes for dissatisfaction are disappearing.

Taxation

Taxation, as a subject for national consideration, is being shifted from the national arena to local arenas where public economies and sound fiscal policies are badly needed to curb extravagant expenditures and public indebtedness. The disinclination of the administration to permit federal taxation to become prominent as an issue at this session of Congress probably will prevent the passage of any drastic amendments, although several will be introduced.

Senator Reed Smoot, chairman of the Senate Finance Committee, is said to be opposed to any immediate attempt to amend the revenue laws unless the soldier bonus is enacted. The sweeping changes that have been proposed by Senators La Follette and Brookhart and Representative Frear, including the reenactment of the excess profits tax, are not expected to be adopted as measures to finance a bonus. It is still the plan of Secretary of the Treasury Mellon to urge a reduction of surtaxes. It is not believed that the capital stock tax will be repealed during the coming session, although its repeal will be urged.

Agricultural Relief

The Interstate Commerce Commission is now conducting an exhaustive investigation of freight rates affecting the agricultural industry. The unfortunate plight in which western wheat farmers have found themselves as the result of unfavorable market conditions is causing them severe hardship. It may be found that rates on farm products can be reduced. In determining the reasonableness of rates on grain and grain products, the Commission doubtless will

consider the general level of rates on other commodities, and particularly rates on mine products.

Muscle Shoals again looms in the offing as a subject of national interest when Congress convenes. Senator Ladd, of North Dakota, has stated that he will demand an investigation of the sale of the Gorgas steam plant which was included in the proposals for the development of the Muscle Shoals project by a private corporation. According to high government officials, the Gorgas steam plant is not essential to the development of the balance of the project, and its sale will not affect the leasing of the project under the federal water-power act by any interest or group of interests that may be interested in undertaking the exploitation of its potential possibilities.

International Relations

The mining industry of the United States would benefit by the stabilization of foreign currencies and the restoration of foreign credit, particularly those of the countries of central Europe. As the purchasing power of European nations generally has been at a low ebb, foreign markets have been unable to absorb America's available supplies of raw materials and manufactured products. The settlement of the foreign debt at an early date would aid in the restoration of European credit. The settlement of the reparations controversy and the evacuation of the Ruhr industrial region by France also would open the European markets for many materials and manufactures which America is ready to export. Many Senators and Representatives have returned from vacations and studies in Europe and Russia, and are preparing to offer recommendations to Congress as to how this country can encourage the rehabilitation of Europe and Russia without abandoning its time-honored policy of avoiding foreign entanglements.

Gold and Silver

The Senate Commission of Gold and Silver Inquiry has assembled a mass of data on the gold and silver industries of the United States. These data will enable the Commission to consider every aspect of the situation in its report which will be made at an early date. The world needs silver and gold. The present rate of production is far below normal. The cessation of operations in many mines is resulting in great economic as well as private losses. Something must be done to stimulate the demand for silver and to open the markets to producers of gold which are now closed by reason of the fact that gold for manufacturing purposes can be purchased from the government at the statutory price of $20.67 an ounce.

C. C. Griggs

The outlook for the mining industry is far from discouraging. The general trend of legislative thought seems to be along constructive lines. Such measures as the Denison "blue-sky" bill, the undistributed surplus tax, interstate regulation of coal by a federal agency, compulsory consolidation of railroads, repeal of the Transportation Act, and limitation of powers of the Supreme Court have few strong supporters, and are not the result of popular demand.

Leaders of radical tendencies have been sobered by the loyalty and patriotic fervor of the American people which found expression everywhere following the death of the late President Harding. Leaders of all political groups realize that the American people desire more constructive effort and less politics in the enactment of legislation. The collective eye of the American public is focused upon the national capital. Members of Congress should expect to have their records closely scrutinized by their constituencies.

I DO WISH WE COULD GET SOMETHING THAT WOULDN'T FALL TO PIECES THE FIRST TIME A LITTLE EXTRA PRESSURE IS PUT ON THEM
HOW ABOUT A NEAT LITTLE STRAIGHT JACKET EFFECT OUT OF THIS MATERIAL
FEDERAL
SUPERVISION
COAL OPERATORS

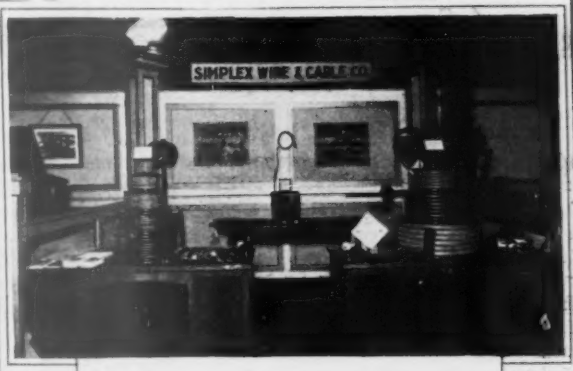
UTAH MAN FAVORED

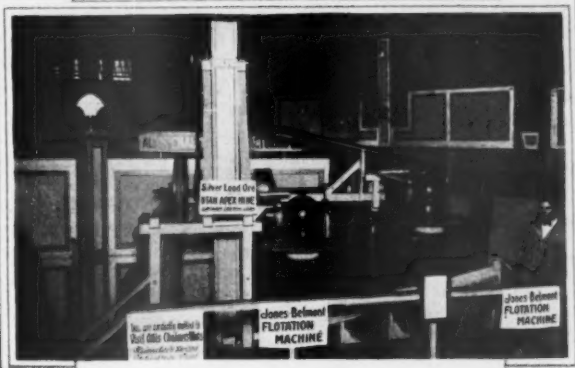
C. C. GRIGGS, of Salt Lake City, Utah, has been appointed assistant head of the newly created Engineering Division of the Income Tax Unit, Bureau of Internal Revenue. Major Griggs, who served in the World War as an officer of the Ordnance Department of the Army, has had more than twenty years' experience as a mining engineer in the Black Hills and Rocky Mountain regions of the West. He was graduated from the University of Nebraska in 1897, and since that time has been engaged in metal mining. He was formerly chief of the non-metals valuation section of the Natural Resources Division.

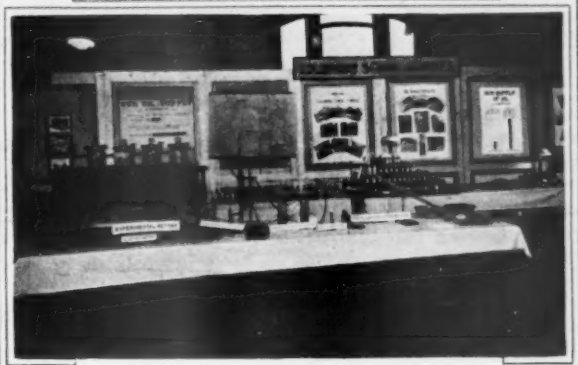
COST DATA REPORTS

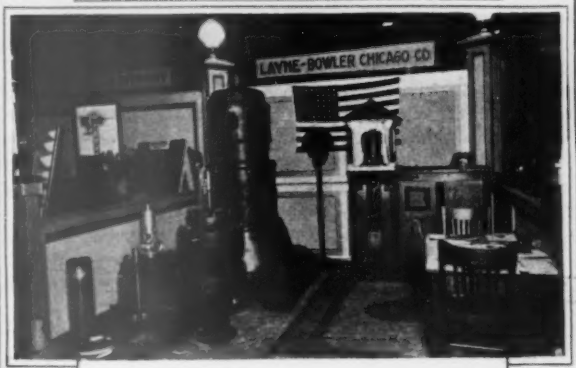
A DECISION is expected to be handed down by the United States Supreme Court during its present term in an important case involving the right of the Federal Trade Commission to require monthly and other reports of cost of production of coal, iron and steel and other basic industrial materials. The Federal Trade Commission during the war sought to study the relation of cost of materials to the cost of living, under an appropriation of Congress. The Commission instituted a series of questionnaires to the coal and steel industries on these subjects and several reports on coal were issued, but none on steel or iron. Certain coal interests attacked the authority of the Commission to require this data on the ground that it did not involve interstate commerce, and the Maynard Coal Co. was successful in obtaining an injunction in the District of Columbia courts restraining the Commission from obtaining this data, since which time this field of inquiry has been abandoned by the Commission pending the outcome of the litigation. About the same time as the Maynard Coal suit, the Commission instituted a suit against the Claire Furnace Co. and other iron and steel interests to compel the furnishing of this data. The District courts ruled against the Commission in this proceeding also and the case is now on appeal to the U. S. Supreme Court for final determination as to the authority of the Commission in this respect. The case will be argued before the Supreme Court on December 3 and it is expected a decision will be handed down early in the new year. The Maynard coal case is on appeal before the Court of Appeals of the District of Columbia and its determination will rest upon the decision of the U. S. Supreme Court in the Claire Furnace case.

TYPICAL EXHIBITS AT THE NATIONAL EXPOSITION OF MINES AND MINE EQUIPMENT
26th ANNUAL CONVENTION THE AMERICAN MINING CONGRESS









PROGRESS OF STANDARDIZATION IN THE UNITED STATES

A Summary of Forty Years of Patient Effort to Encourage Progress Without Bringing Too Great Inconvenience and Costs to the Users of Modern Mechanical Devices—The Organized Efforts

By Col. Warren R. Roberts,

Chairman General Committee, Coal Mining Branch of the Standardization Division, American Mining Congress

Part II

(*Continued from September issue*)

Manufacturers' Associations

Many manufacturers' associations are actively interested in standardization. These associations in many industries have done a very considerable work on standardization, and in several industries very extensive programs have already been completed and standing committees are still actively carrying on the work.

I have received definite reports from only a few of these manufacturers' associations, but sufficient to indicate the extent and varied character of the programs on standardization that they are carrying on.

Associated Manufacturers of Electrical Supplies: The secretary furnished me with the following list of "adopted standards":

Standard on rigid conduit.

Standard on cartridge enclosed fuses.

Standard on renewable cartridge enclosed fuses.

Standard on cutout bases.

Standard on high potential fuses.

Standard on flexible tubing.

Standard on metal raceways for surface wiring.

Standard on air circuit breakers.

Standard on wire entrance holes in electrical wiring devices.

Standard on laminated phenolic condensation plate.

This association is a member of the Electrical Manufacturers' Council, which is a member body of the American Standards Committee. Through its membership in the Electrical Manufacturers' Council, the association is also represented on the United States National Committee of the International Electrotechnical Commission.

The association is actively engaged in standardization work through a general standards committee, which coordinates the specific standardization projects carried on by the twenty-three sections into which the membership of the association is divided. These sections are composed of manufacturers of specific lines of electrical supplies, such as wire and cable, panelboard and switchboard, electrical porcelain and so forth.

The Association of American Steel Manufacturers: The secretary furnished me a lengthy statement regarding the standards which this association has already created and the projects which are still under consideration. From this statement, I will quote a few paragraphs to indicate the extent of their work:

"The association was formed in 1895, with representation from 13 of the leading steel manufacturing companies of this country. Not only one of the earliest activities of this association but one of its principal activities has been its work on standardization. Their work pertains to the standardization of specifications; the standardization of practices controlled by specifications and similar subjects. Matters of a commercial nature, such as prices, cost accounting and so forth, are not considered or discussed by this association.

"The first work of the association was the adoption in 1895 of standard specifications for structure and boiler steel. These specifications are used as the basis for the standard specifications for structure and boiler steel adopted by the American section of the International Association for Testing Materials in 1901 (reorganized as The American Society for Testing Materials in 1902). These standard specifications have been revised from time to time, in line with increased knowledge and new developments in the manufacture of steel products.

"In 1896, the association adopted a set of standard profiles of structural beams, channels and angles, known as 'American Standard Sections.' These were unanimously adopted by the American mills, and are still in use.

"Other standards that have been adopted by the association are:

"1. Specifications for concrete reinforcement bars rolled from billets, in 1910, and

"2. Specifications for rail steel concrete reinforcement bars, in 1912.

"These specifications were the result of an extensive investigation made by the association and they have been used as the basis for similar specifications of the American Society for Testing Materials.

"3. Specifications for open-hearth blooms, billets and slabs for forging purposes, in 1912.

"4. Specifications for open-hearth and Bessemer steel rails, in 1915.

"They adopted as standard practice:

"1. Standard allowable variations in the size and weight of hot-rolled bars, in 1910, and

"2. Standard methods of sampling for check analysis, in 1912.

"At the present time the association is devoting a large part of its activities to cooperation with other standardization bodies, including The American Society for Testing Materials, American Engineering Standards Committee and The Bureau of Standards of the Department of Commerce."

The Railway Car Manufacturers' Association: The president advises that they have made some progress in the standardization of cost accounting systems employed by its several members. It has done very little, except indirectly, in the standardization of railway cars, due to the fact that all matters touching on standardization of cars manufactured by the members of this association must be passed upon by the purchasers of such cars.

However, freight cars in this country are pretty well standardized, that is, all are built to the same gauge; all have standard axles, axle boxes, wheels, couplers, height of couplers above track, brake rigging, and so forth.

The Silk Association of America: The secretary furnished me very extensive information on the standardization work of this association, from which I will quote briefly as follows:

"The silk industry has not been able to proceed very far with standardization work, owing to the influences that fashion has on the fabric of manufacturers. We have, however, standardized to some extent, raw silk, in which connection we have prepared and distributed throughout the world a brochure on the standard form of silk skein and standard testing apparatus and tests.

"In the abstract, we have also standardized on market rules and regulations."

Industrial Associations

The reports of many associations which I have grouped under the above title indicates that associations of this character are carrying on very extensive programs on standardization. Space will permit me to review only the work of a few.

American Electric Railway Association: I quote the following from a letter by the executive secretary:

"Our engineering association appointed

a standards committee in 1906, and has been very active in formulating engineering standards for the electric railway industry. All of the standards adopted by our association are published in our engineering manual. Our standards are of three classes, namely, "standards," "recommended standards" and "miscellaneous methods and practices." We have this year sixteen committees in the engineering association, and, in addition to these, we are represented on about twenty sectional and special committees of the American Engineering Standards Committee.

"In June, 1922, our association submitted 13 of its standards to The American Engineering Standards Committee for adoption as national standards.

"We are advised that six of these standards have been approved unanimously by the member bodies of The American Engineering Standards Committee. The other seven specifications are still in the hands of special committees of the A. E. S. C."

American Railway Association: The amount of standardization on railway equipment already accomplished by this association and the program which is still actively carried on through the mechanical division and the construction and maintenance section and the signal section of the engineering division is so extensive that I can only summarize what this association has done and is doing to standardize railway equipment.

The mechanical division of this association, including master car builders, and master mechanics, has issued a manual of standard and recommended practices, which contains 52 specifications for materials ranging in importance from the axles for cars and locomotives to insulating paper for refrigerator cars.

The construction and maintenance section of the engineering division advise that this section have not heretofore formulated standards. This work has been along the lines of simplification and unification—its findings and conclusions being more properly comprehended within the term "recommended practice."

In 1919 this section appointed a special committee on standardization, composed of the chairman of twenty standing committees. Instructions given this special committee were:

"(1) Request the appropriate committees to each select one or more articles for 'standardization,' with instructions to harmonize the views of the railways and manufacturers as much as practicable, and to prepare plans and specifications of as few sizes as will meet the needs of the railways.

"(2) Secure the general use by railways of the standards and specifications, bringing about a realization of all possible economies in time and money."

The chairman of the standardization committee of this section is the official representative of the association on The American Engineering Standards Committee. This section is also officially represented on nine sectional committees of The American Engineering Standards Committee.

The signal section of the engineering division of this association have adopted a very extensive list of symbols and abbreviations comprising some sixteen printed pages as their contribution in standardizing signals in railway operations.

Part I which appeared in September issue and Part II of this interesting treatise on Standardization will be published in pamphlet form and a limited number will be furnished to those desiring them for distribution.

American Gas Association: We quote the following from a letter by the secretary-manager:

"In 1911 and 1913, standard specifications for cast iron pipe and special castings were adopted by the American Gas Institute and were revised in 1922 by the American Gas Association. They are used generally throughout the industry.

"Standard gas range specifications and standard gas fixture specifications:

"These specifications have also been adopted by the association and are in general use by the manufacturers of gas ranges and gas fixtures.

"The association maintains a standing committee on each of these specifications to keep in touch with the progress of the industry and make revision in the specifications from time to time, to keep them up to date with the best practice.

The association also issued a specification tag, which is used by the manufacturing companies to indicate that ranges and fixtures have been built according to the standard specifications of the association.

"A standing committee is also working up standards of 'consumers' meter capacities and ratings.'

"The chemical committee published, in 1921, what was known as 'The Gas Chemists' Handbook,' which is a compilation of known and established laboratory methods in use by gas companies, by-product coke oven companies, and so forth.

"A standing committee on tests is also maintained, with sub-committees that conduct what are known as 'cooperative laboratory analyses,' for the purpose of checking up the methods used by member company laboratories and developing not only laboratory efficiency but new methods which may prove desirable. "In 1912, a committee on calorimetry submitted a report which included construction and erection of calorimeters. While this report was not definitely adopted as a standard, it was generally followed, with certain modifications.

"In 1920, the consumers' meters committee published a manual known as 'Instructions for Testing, Handling and Minor Repairing of Dry Gas Meters,' which represents the standard practice in the industry."

American Bureau of Shipping: In 1919, the American Engineering Standards Committee formed a sectional committee on steel shapes. This bureau was represented on this sectional committee, together with representatives from several other national associations and the U. S. Navy Department. The committee rendered a report in June, 1920, which embodied important improvements and was unanimously approved by all the representatives on the committee with the exception of the Association of American Steel Manufacturers. The report was held in abeyance awaiting such approval.

This bureau is also represented on a sectional committee and three sub-committees on the standardization of pipe flanges and fittings. Work by these committees is now in progress.

The bureau is also represented on sectional committee on standards for electrical installations on shipboard, together with other national associations and the American Institute of Electrical Engineers.

This sectional committee, together with its sub-committees has made substantial progress in formulating recommendations to be known as "Recommended Practice for Electrical Installations on Shipboard," popularly known as "Marine Rules."

The bureau is also represented on a sectional committee recently formed on hose specifications, to cooperate with the federal specification board, relative to proposed hose specifications.

The bureau is also represented on sectional committees with the American Society of Testing Materials, preparing standard specifications and testing requirements for the principal materials used in marine construction.

The extent of the work on standardization in which this bureau is interested is such that to facilitate the work the

United States has been divided into three panels:

(a) Atlantic Coast and Gulf.
(b) Great Lakes.
(c) Pacific Coast.

Within each panel there will be a series of sub-committees assigned to the task of determining certain specified standards adopted for use within their territory.

It will also be of interest to know that this bureau has working agreements with various foreign classification societies to formulate "Rules and Regulations" of each society that are considered mutually effective for purposes of ship classification.

National Safety Council: This council concerns itself chiefly with the creation of safety codes. This is standardization along safety lines. It cooperates with the National Manufacturers' Associations, National Industrial Associations and all similar organizations for the promotion of safety in all industries.

The council acts largely as a directing and coordinating body and also in an advisory capacity, in having these safety codes formulated and adopted. The council is therefore in touch with and encourages all work in standardization, and especially as applied to safety throughout the United States.

Many safety codes have already been created and adopted, and some forty or more are now in the process of formation.

National Fire Protection Association: The executive assistant reports that up to the present the only standard they have formulated which has been approved as an American standard is the national electrical code.

The association is, at the present time, sponsoring a building exits code, and members of the association are assisting on committees formulating other codes.

In addition the association has published 29 standard regulations for fire protection and the safeguarding of hazards, also published suggestions for state laws for regulating fire hazards, also published suggestions for municipal ordinances for regulating fire hazards, also published some 47 educational pamphlets on fire prevention and fire protection, also 27 special bulletins and special fire reports and lastly carries on a continuous campaign for safety against fire hazards through posters, publications, and so forth.

National Association of Mutual Casualty Companies: This association reports that their work on standardization consists in having representatives of the Association act on sectional committees with other national organizations in the production of safety codes for various industries. The association has been represented by a committee which has already prepared several safety codes and are represented on such committees having under preparation now safety codes for such varied industries as textiles, laundries, logging and sawing mills, construction work, grinding wheels, paper and pulp mills, power presses, wood working machinery, machine tools, ladders, mechanical transmission of power, foundries, electrical power control, building exits, elevators, conveyors and conveying machinery and colors for traffic signals, etc.

National Bureau of Casualty and Surety Underwriters: This bureau advises that their interest in standardization lies particularly along the lines of promoting safety codes. The bureau is a member of The American Engineering Standards Committee and the associate general manager of the bureau is at the present time chairman of this committee.

The bureau is also a member of the Electrical Safety Conference, which is the standardizing body in certain electrical fields.

Its interest is primarily the formation of safety standards that can be used as a basis for the schedule rating system which is a system for the modification of Workmen's Compensation and Employers' Liability rates upon the basis of the actual physical conditions that are found in the plant.

The bureau has representatives on 29 safety code committees and are also a member of the safety code corrulating committee and of the sub-committee on scope of the safety code corrulating committee.

National Association of Purchasing Agents: This association advises, through its secretary, that up to the present time it has devoted its attention to standardization of the catalog and invoice and the purchase order and folders used by the association.

In addition it has developed coal contract and iron contract forms which are largely used by members of the association.

The association has also cooperated with the Petroleum Institute in the development of standard rig iron which is used largely in the oil industry. At the present time the association is engaged in very serious research undertaking to institute centralized purchasing in each of the governmental units.

Government Agencies

Sixteen departments and commissions of our national government are now carrying on extensive work either in standardization or simplification. Several of these departments, such as the Department of Commerce, the Department of Labor, the Treasury Department, and the Navy and War Departments have several separate bureaus standardizing in their respective products.

The National Bureau of Standards of the Department of Commerce was one of the first institutions in the United States to undertake the creation of standards. The bureau started in a small way, under the direction of S. W. Stratton and, due to his efficient management, gradually gained the confidence of the various governmental departments that should patronize the bureau.

The Bureau of Mines of the Department of the Interior is the next oldest government agency devoted to improving conditions, perfecting equipment and otherwise working for safety and economy in the mining industry.

This bureau has already submitted several of their bulletins covering proper and safe methods and equipment for mining, to the American Engineering Standards Committee.

Soon after Herbert Hoover became secretary of the Department of Commerce, he organized a Division of Simplified Practice. This division has been very active in promoting simplification in many industries. Simplification can be advantageously applied in almost any industry and is often applied in connection with standardization. However, in this particular campaign of simplification, carried on by the Department of Commerce, the effort, as I am informed, has been principally in those industries where simplification was most urgent in reducing the number of sizes, types and so forth, of products in such industries.

One of the latest and most important movements of our national government on behalf of standardization was the formation of the Federal Specification Board. The first objective of this board was to unify the specifications in the various departments and bureaus of the national government for similar products. Cooperation between the Federal Specification Board and commercial organizations was effected through the American Engineering Standards Committee. On November 16, 1922, this committee released for publication an important document covering this subject, from which I quote the following:

"An important step toward the elimination of the differences between specifications for government purchases and the usual practice of commercial suppliers has been taken through the appointment by the American Engineering Standards Committee of a Standing Committee on Cooperation with the Federal Specification Board.

"Work carried out under the general direction of this committee will give industry a better opportunity to participate in the development of specifications

for government purchases and it will at the same time bring to the government, to a greater degree than has heretofore been possible, the talent of the 200 industrial organizations cooperating in the work of the American Engineering Standards Committee.

"It is the unanimous opinion of the federal officials and the officers of the A. E. S. C. that this cooperation between manufacturing industries, the government and other consumers will result in a widening of the source of supply for all government requirements and in important economics not only to the government but to other consumers of those products which are also required by government departments. It is expected that these economics will run into many millions of dollars yearly.

"The specifications which have already been submitted by the Federal Specifications Board to the American Engineering Standards Committee under the new cooperative arrangement cover the following:

Hose for various industrial purposes.
Wood Screws.
Sterilizing Equipment.
Cotton Duck.
Phosphor Tin.
Silicon Copper and Pig Lead.

Among the specifications which have been officially adopted by the Federal Specifications Board for the use of all government departments and which will come up for review and possible revision within a year are the following:

Portland Cement.
Linseed Oil, Raw, Refined and Boiled.
Boiled Turpentine.
White Paint and Tinted Paints made on a White Base Semi-Paste and ready mixed.
Iron-Oxide and Iron-Hydroxide Paints.
Volatile Mineral Spitite for Thinning Paints.
Petroleum Products.
Basic Carbonate, White Lead, Dry and Paste.
Zinc Oxide. Dry and Paste.
Red Lead. Dry and Paste.
Black Paint, Semi-Paste and Ready-Mixed.
Pneumatic Tires, Solid Tires and Inner Tubes.
Basic Sulphate, White Lead, Dry and Paste.
Leaded Zinc Oxide, Dry and Paste.
Ocher, Dry and Paste.
Green Paint, Semi-paste and Ready Mixed.
Water Resisting Spar Varnish.
Asphalt Varnish.
Interior Varnish.
Liquid Paint Drier.
Large Incandescent Electric Lamps.
Flat Interior Lithopens Paint, White and Light Tints.
Lumber.
Composite Thinner for thinning Semi-paste Paints (when the use of straight Linseed Oil is not justified).

The U. S. Navy Department and the U. S. War Department were brought to a realization of the need of standardization of their products during the World War, and each of these departments made very material progress on standardization before the close of the war. Since the war each department, through several different bureaus, have carried on extensive work on standardization, with the object of securing definite and uniform specifications for each and every product used by either department from whatever bureau a requisition for purchase may come.

PUBLIC INTEREST IN STANDARDIZATION

When I was gathering data for this article I expected to cover, at some length, the public's interest in standardization, and for this purpose accumulated a very considerable amount of literature on the subject of "The Public's Interest," but I find that the length of my article prohibits making use of this valuable material at this time. I can only express my appreciation to all those who have furnished me this information and hope that at some future time I can use it in another article.

RESEARCH WORK DONE ON OIL SHALE

Research work on oil shale is now being conducted by the Department of the Interior, through the Bureau of Mines, in cooperation with the State of Colorado, the University of Utah, and the Department of Conservation of the State of Indiana. The object of this work is two-fold: First, to determine the conditions of retorting that produce the highest yields of the best oil from various shales, and, second, to make a thorough study of methods of refining shale oil.

Research conducted by the Bureau of Mines at the Boulder laboratory, in cooperation with the State of Colorado, for the past year has been with an experimental vertical retort, a large horizontal retort, and a small assay retort.

The experimental vertical retort is so designed that it gives results which might be comparable to those obtained from commercial retorts of this type. Experiments are being made to determine the effects of time and temperature of preliminary heating, holding at various temperatures, use of steam in the retort, etc. A complete analysis is made of all the products obtained.

The results obtained with the horizontal type of retort have not been very satisfactory as it gives a lower yield of oil of a poorer grade than that obtained from the other retorts.

NEW MEXICO CHAPTER ELECTS OFFICERS

THE New Mexico Chapter of the American Mining Congress held its third annual meeting at Silver City, New Mexico, on October 8. The meeting was well attended by mining men from all over the state and problems affecting the mining industry at the present time were discussed in detail. The purport of these discussions indicates that New Mexico mining men are convinced that the period of depression is over and that the mining industry is destined for exceedingly prosperous times.

The address of welcome was made by J. B. Gilchrist, president of the Grant County Chamber of Commerce. E. M. Sawyer, general manager of the Burro Mountain operation of the Phelps Dodge Corporation, was presiding officer.

An address was made by John M. Sully, general manager of the Chino Copper Company, on "The Year Just Past."

S. J. Kidder, general manager of the Mogollon Mines Company, discussed the Pittman Act and the silver producer.

Ira L. Wright, manager of the Black Hawk Consolidated Mines Company, addressed the meeting on "Non-Metalliferous Minerals in New Mexico."

R. J. Grissom, assistant superintendent of mines of the Chino Copper Company at Santa Rita, spoke on a comparison of mining methods in the United States and South America. Mr. Grissom has just returned from a seven years' stay in South America and his remarks were therefore timely and of especial interest to mining men in New Mexico.

Herbert Wilson Smith, chief of the Mineral Tariffs Division of the American Mining Congress, gave a short talk on "The Functions of the American Mining Congress."

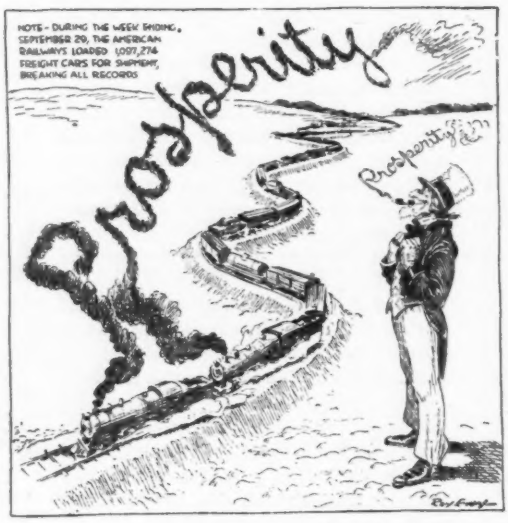
New officers were elected to include E. M. Sawyer, Tyrone, governor; John M. Sully, Santa Rita, first vice-governor; C. T. Brown, Socorro, second vice-governor; S. J. Kidder, Mogollon, third vice-governor; J. F. Woodbury, Silver City, secretary; and Ira L. Wright, Silver City, treasurer.

"Anthracite mines have conserved the country's coal resources by steadily increasing the percentage of coal recovered and sent to market; they have economized in the capital employed by closer adjustment of mine capacity to production and in man-power by eliminating the cost of idle days for men as well as for plants, resulting in a corresponding improvement in the economic condition of the mine workers."—*From Coal Commission's Report.*

ARE TRANSPORTATION ILLS MAGNIFIED?

Many Organizations Investigating Elusive Railroad Problems — Roads Handling Greatest Volume of Traffic in History—Mining Industry Profits by Railroad Prosperity

THE study of transportation ills is being carried almost to an extreme. The Interstate Commerce Commission, whose studies are going on continuously; the National Industrial Conference Board, which recently issued a report on the railroad situation; the Research Council of the National Transportation Institute, which is conducting an investigation of railroad conditions; and the United States Chamber of Commerce, which feels that it has as much right as any other organization to suggest solutions for railroad problems—all apparently are proceeding on the theory that something is radically wrong and that that something must be found and righted.


NOTE - DURING THE WEEK ENDING, SEPTEMBER 29, THE AMERICAN RAILWAYS LOADED 1,097,274 FREIGHT CARS FOR SHIPMENT, BREAKING ALL RECORDS
Prosperity
Prosperity &c.

From Columbus Dispatch

Nothing Radically Wrong

Now the fact is that there is nothing radically or fundamentally wrong with the railroads. The roads have passed through a most severe trial. Their managements have been up against every sort of interference, both on the part of the government and on the part of their employes, and also have been confronted with problems of business depression. The Transportation Act of 1920 relieved the pressure of governmental interference to some extent, employes have been temporarily soothed with increases in wages, national prosperity has been attended by the greatest volume of freight traffic in the history of the country, the roads have been able to adjust their affairs to meet the requirements of the Transportation Act, and the general condition of the railroads is at present exceedingly favorable.

The report of the National Industrial Conference Board may be considered both sound and conservative in view of present conditions. It recommends the retention of the present transportation act without change. The board is "for giving the act a fair trial in the next two years, in the hope that during that period such favorable results may be attained that railroad credit will be restored, rates lowered without impairing earnings, and consequently any further legislation rendered unnecessary." This policy is favored by many organizations of shippers and consumers that have made special studies of conditions.

Dr. David Friday, director of the Research Council of the National Transportation Institute, predicts that a demand for nationalization of railways is likely to be the central issue of the presidential campaign of 1924. It goes without saying that such a prediction is based upon a belief that the farmer-labor elements will have something to do with the framing of political issues. However, we find these elements in an anomalous position, with the farmers asking for reductions in rates and labor asking for increased wages which would absolutely prevent rate reductions.

The United States Chamber of Commerce is fostering conferences between railroad executives, shippers and consumers for the purpose of getting all elements to agree upon a constructive program with respect to the relation which should exist between transportation systems and government, state and federal, and the policy toward these systems which will the more quickly bring about proper rate adjustments and needed expansion of facilities. Conferences between railroad officials and shippers which lead to efficient cooperation are certain to be helpful.

Commission Active

The Interstate Commerce Commission is conducting a number of rate investigations, the carriers' reports are regularly analyzed, the car service division is watching closely the efforts of the railroads to handle the greatest volume of traffic in their history without serious car shortages and embargoes, the valuation division is proceeding with the work of valuation of the roads, and the commission's staff of examiners is continually bringing in the information gathered at hearings which are held at frequent intervals throughout the country to enable shippers to more conveniently present their complaints and claims with respect to particular rate adjustments.

From these diversified efforts, some good should result. It is essential for Congress to have facts before proceeding to amend the law; that is, if any amendment is needed. There has been much loose talk in circulation regarding railroad valuations, railroad earnings, railroad management, and railroad policies. The situation has been somewhat difficult to analyze. If the various interests now engaged in studying transportation problems are able to agree as to the facts, there should be no uncertainty concerning what should be done.

All Records Broken

Some facts can not be overlooked, and these are favorable to the roads. Records of freight loadings have been broken repeatedly this year. The greatest number of cars for any one week in history prior to October 1 was loaded with revenue freight during the week which ended on September 29. While freight loadings are ordinarily heavier at this time of the year than at any other, owing especially to the seasonal crop and coal movements, the roads had 41,745 surplus freight cars in good repair and immediately available for service on September 30. The actual car shortage on that date amounted only to 15,331. These facts show that the railroads are approaching a degree of efficiency which enables them to handle peak seasonal traffic as well as normal traffic. Railway officials are doing their utmost to attain the objectives specified in their program adopted last spring.

Railroad Earnings

The Bureau of Railway Economics reports that 193 class 1 railroads, representing a total mileage of 232,964 miles, earned in August an annual rate of return of 4.94 percent on their tentative valuation as fixed by the commission for rate making purposes, including addi-

tions and betterments up to January 1, 1923. In the eastern district, the rate earned was 5.16 percent; the southern district, 5.38 percent; and the western district, 4.60 percent.

Class 1 roads in 1922 used materials and supplies costing $1,668,000,000, according to a report prepared by the Bureau of Railway Economics, which shows the extent to which the railroads are among the largest purchasers of raw materials in the country's basic industries.

Mining Industry Affected

The extent to which the mining industry is affected by railroad purchases is shown by the fact that they buy annually 27.8 percent of the bituminous coal output; 6 percent of the anthracite production; between 12 and 15 percent of the annual iron and steel output, consumed directly, and indirectly about 30 percent through their orders for all kinds of equipment; about 10 percent of the copper and brass produced; and a large percent of tin, lead and zinc production. This year, the railroads will purchase in excess of $1,200,000,000 worth of materials and supplies, and the mining industry will share very materially in the prosperity occasioned by this vast outlay of capital.

The prosperity of the railroads undeniably is a prerequisite to prosperity in the mining industry. As the purchasing power or credit of the roads improves and capital is used for expansion, the mining industry profits. If railroad earnings fail to yield a fair return, so that needed capital is at a premium, and investors avoid railroad securities, the mining industry, as well as other industries, suffers.

Uncertainty Disables

Uncertainty as to labor relations and as to congressional action does not seem to be a desirable condition at the present time. But if railroad executives are permitted to look into the future, with a clear track ahead, it may be that the earnings problem, the expansion of facilities problem, the labor relations problem and the rate problem will adjust themselves without further governmental interference. The general trend of conditions certainly points in that direction. If railroad rates are too high, why can not the public, the shippers, the consumers, and the governmental agencies cooperate with the railroad executives to bring about conditions which will justify voluntary reductions and which will ameliorate the difficulties with which the railroads have been confronted during the last few years?

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RAILROAD RATES

Four important cases are scheduled for early hearing before the Interstate Commerce Commission. On November 16 the Commission will begin final hearings in regard to consolidation of railroads. On October 31 the Commission will rehear the application of the Virginian Railroad for authority to extend its line in Wyoming County, W. Va., to develop coal fields. The Commission previously rejected this application on the ground that there are already too many coal mines. The case involving distribution among coal mines of privately owned cars and cars for railroad fuel will be heard October 22.

Hearings as to the reasonableness of anthracite freight rates will be heard late this month and in November at various eastern points.

Suggestion that freight rates on anthracite to Canada be the same as those to northern New York and New England has been made by President Coolidge to President Rea of the Pennsylvania Railroad. It is said that the fact that coal is shipped to Canada at lower freight rates than for domestic consumption in the United States is a source of complaint in New England.

While it is understood that the President considers that the difference in rates may be a sound economic railroad consideration, he, at the same time, thinks this fact is overbalanced by a reason of policy in that people of New England feel that they are not treated as fairly as those in Canada in the matter of freight rates.

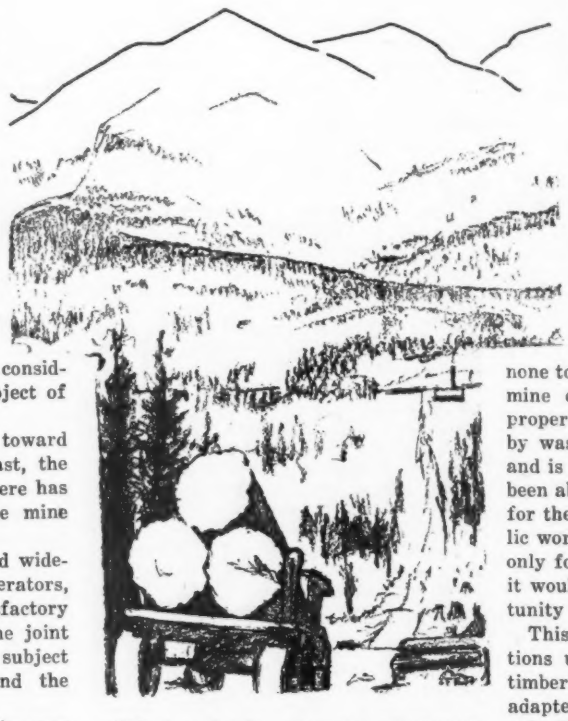
The I. C. C. has set aside its suspension of rates on iron and steel on the Pennsylvania Railroad from Pittsburgh, Oil City and Erie, east, and on the West Jersey and Seashore Railroad, but has continued its suspension until February 4 of other iron and steel rates between central freight association and trunk line points.

The Salt Lake Iron & Steel Company alleges unreasonable rates on ship windlasses to Oakland, Calif., and the West End Scrap Iron & Metal Company of Duluth, unreasonable rates on scrap iron from South Range, Minn.

MINE TIMBERING COSTS INCREASING

As Available Supply Decreases, Costs Mount, Until Many Companies Are Face to Face with Necessity of Using Substitutes

THE cost of mine timbering has been steadily increasing as the supply of timbers has diminished. The prodigal use of timber already has developed a serious problem in many mining districts, until it has been necessary for many companies to find substitutes. It has only been the last few years that any effort has been made to conserve timbers, treat them with preservatives or to reforest cleared areas. Even in those mining districts where desirable timber is still plentiful, serious consideration is being given to the subject of reforestation.



As an indication of the apathy toward this subject, until the recent past, the Forest Service points out that there has not been a survey made of the mine timber situation for 18 years.

The increasing cost has aroused widespread interest among mine operators, and the indications are that satisfactory results may be expected from the joint investigation of this important subject by the government bureaus and the American Mining Congress.

The United States Forest Service was one of the first agencies to call attention to the importance of the subject. It was presented to the Standardization Division of the American Mining Congress and immediately there was added to that division a section for both metal and coal mining branches to investigate and make recommendations concerning mine timbering.

Their investigations cover every phase of the subject, the main committee being divided into five sub-committees and covering the following classifications:

1. General mine timbering.
2. Preservation of mine timbers.
3. Use of concrete in mine timbering.
4. Use of structural steel for mine timbering.
5. Salvage of mine timbers.

These committees have now been functioning for a period of two years, and the first three sub-committees have issued two reports making general recommendations.

Mr. R. L. Adams, chairman of the Mine Timbering Section, Coal Mining Branch, Standardization Division, in his report to the Twenty-sixth Annual Convention of the American Mining Congress and the Fourth National Standardization Conference had the following to say:

"Most coal mine operations find their timber cost increasing and the quality less desirable each succeeding year until we are in some fields brought face to face with the absolute necessity of substituting with concrete and steel. Even in the localities favored with a sufficient supply of native timber, concrete and steel are being used for the sake of permanence and low maintenance cost. Assuming that either from choice or necessity wood is replaced by concrete and steel or is given a preservative treatment to prolong its life, there will still remain the demand for a grade of timber for which no practicable substitute has been offered. Room props may generally be classed as temporary timbering. When these room props have fulfilled the purpose for which they were intended and if they are still sound, the labor cost and the attendant danger to workmen make it impractical to attempt their salvage except under very favorable conditions.

"In southern Illinois, perhaps one-third of the props in a room at the time of its abandonment are reasonably sound. Yet if they are recovered and used again, available data indicates no financial saving.

"The manufacture of room props is perhaps the most crude of that of any timber used in or about a coal mine. Column strength and an effective life of two or three years is about all that is desired, but if the timber supply of the nation becomes depleted to the point where room prop material becomes more valuable for other purposes, then we are confronted with a problem of substitution that may be hard to solve. Reforestation has been suggested as a remedy, and if we concede the absence of a better solution, the present is none to soon to begin. Thousands of coal mine operations and undeveloped coal properties are overlaid, in part at least, by waste land that has been deforested and is not suitable for cultivation or has been abandoned by the erstwhile farmers for the more remunerative wage of public works. Much of this land is valuable only for what lies below the surface and it would seem to offer a splendid opportunity to begin reforesting."

This committee makes recommendations under its report on general mine timbering as to kinds of timbers best adapted for mines, and advocates white oak, black oak, red oak and chestnut as being most suitable, where it can be secured at anything like competitive prices, as against other hard woods, such as hickory, red elm, maple or hemlock. They recommend that all timbers should be systematically piled on stringers, parallel with the track or roadway in such a manner as to insure a free circulation of air through the pile.

The diameter of props should not be less than 1 inch for each foot in length. Bars and legs not over 8 feet in length may be 6 inches in diameter at the small end and a 10 or 12 foot bar not less than 8 inches at the small end.

In the sub-division—Timber Supply and Cost—the committee reports that: "The local supply that can be delivered by team is rapidly becoming a thing of the past, except in a few favored localities. The freight on timber delivered by rail averages over 30 percent of the cost f. o. b. the mine and in some instances as much as 50 percent. Reforesting should be practiced in districts where the country is not suited to farming. Some large operating companies report as much as 2 feet board measure and 2 prop feet of timbers per ton of coal mined, mostly consisting of room ties, car lumber, brattice, and straight mine timbers. The amount used will

vary a great deal in the different fields and is being largely eliminated in some mines by the use of steel ties, gunite, and steel timbering."

The Sub-Committee on Timber Preservation, through its chairman, Mr. George M. Hunt, believes that the use of preservatives for mine timbers is making progress, although it is not as rapid as might be desired or as may be expected when mine operators become better acquainted with the various wood preservatives and the methods of using them. The cost of treating mine timbers has averaged about $.31 per cubic foot. This figure includes some overhead, but nothing for depreciation.

The Mine Timbering Section has made very constructive recommendations for general mine timbering, use of preservatives and wood treating, uses of concrete in place of timber, and has two additional sub-committees that will make reports this year that are studying the subjects of the use of structural steel for mine timbering and the salvage of mine timbers.

The Metal Mining Branch, through Mr. Gerald Sherman, its chairman, during the first year of its work collected designs from several sources for simple mine timbering, such as would be used most often by small mines and those in process of development, and recommends a jointly operated timber framing plant in districts where there are many mines. During the present year this committee will make a special effort to secure information on the size and spacing of ties under various loads and rail weights; experiments on the use of timber preservative; and the use of gunite as a substitute for timber and as a fireproofing or decay resisting agent.

It therefore is apparent that these two committees are making a thorough investigation of the mine timbering situation. The United States Forest Service, however, calls attention to the fact that there has been no survey of the quantity and kinds of timbers used in mines in the United States since 1905. At the present time the Department of Commerce, Bureau of Census, in cooperation with the Geological Survey and the Forest Service, is planning to send out a questionnaire to the mining industry collecting such data as will be possible and to make an up-to-date survey of the conditions existing in regard to mine timbers, their uses, and our supply. As replies to Census Bureau questionnaires are compulsory, it is expected that the information, when finally compiled, will be very complete. The following questionnaire will be sent to all mining companies:

1. Description of establishment:
   - a. Name of mine .....
   - b. Location of mine ..... post office ..... county ..... state.
   - c. Name of operating company .....
   - d. Address ..... post office ..... county ..... state.
   - e. Kind of mineral or principal ore produced .....
   - f. Aggregate quantity of coal, ore, or other mineral produced, 1923, ... tons.
   - g. What is the production of an average normal year? ..... tons.
2. Use of treated timber and substitutes:
   - a. Does your mine use any treated timber? .....
   - b. If so, state approximate percent of all timber used underground which is treated with preservative. ..... percent.
   - c. Does your mine use steel or concrete or both as a substitute for timber? .....
   - d. If so, in what year did you begin the use of steel or concrete underground? ..
   - e. Quantity of timber substitutes used underground in 1923. Steel ..... tons. Concrete ..... tons.
   - f. Considering your total yearly construction underground as 100 percent, what part do you estimate is now done in concrete and steel instead of wood? ..... percent.
3. Quantity and kinds of timber used underground, 1923:

A. Sawed timber. (See instruction, page 4.)

Forms[1]	Quantity used (board feet)	Cost at mine (dollars)[2]	Principal state from which obtained
Props			
Ties			
Cross-bars			
Lagging			
Caps			
Totals			

B. Round, hewed, or split timber. (See instruction page 4.) Reply to this question should be omitted if you have sufficient record to permit answering question C instead.

Forms[1]	Aver. diameter (inches)	Total linear (run'g) feet consumed	Cost at mine (dollars)[2]	Principal state from which obtained
Props				
Ties				
Cross-bars				
Lagging				
Caps				
Totals				

C. Round, hewed, or split timber. (See instruction, page 4.) Reply to this question should be omitted if question B has been suitably answered. Either B or C may be used.

Forms[1]	Volume[3] Board feet	Volume[3] Cubic feet	Cost at mine (dollars)[2]	Principal state from which obtained
Props				
Ties				
Cross-bars				
Lagging				
Caps				
Totals				

[1] Add others, if necessary.
[2] Include freight charges.
[3] Express volume of round timbers in either board feet or cubic feet, but do not duplicate quantities.

D. Kinds of wood used. (See instructions, page 4.)

Kind of wood	Sawed (percent)	Round or hewed (percent)
Soft woods:		
Pine		
Fir		
Hemlock		
Spruce		
Tamarack		
Hardwoods:		
Oak		
Maple		
Beech		
Birch		
Chestnut		
Elm		
Aspen		
Totals	100.00	100.00

The United States Bureau of Mines has made recent investigations on mine turbines, and has issued a bulletin—No. 215—on Timbering of Metal Mines, by E. A. Holbrook, Richard V. Ageton and Harry E. Tufft. This bulletin points out that "the kinds of timbers used in mining operations are as varied as the localities in which the mines occur. In some districts in which there is a scarcity of good timber, such as in the Southwest, the prospector and small mine operator use the dwarf varieties found in these arid regions, such as mesquite, sage brush, juniper, cottonwood, pinon, etc.

"Long-grained timbers, such as pine, fir, spruce, oak and chestnut, are preferred because they will crack and split when pressure comes on them, and thus give warning long before they break. Although timbers should be long grained, strong and elastic, they should not be too heavy. Oak and chestnut and other long-grained hardwoods are strong, but many hardwoods are heavy to handle. Short-grained woods are often unreliable as an indicator of dangerous pressure because they may break without warning.

"The use of such flexible woods as hickory, eucalyptus and willow should be avoided, if possible, as they bend easily under pressure and do not offer, in proportion to their size, much resistance to the movement of the rock. The willow especially lacks both strength and durability.

"Those timbers of the Pacific coast that are best adapted to mining uses are Douglas fir, California fir (white fir), Sitka and white spruce, and yellow pine (bull pine), but western hemlock, cedar and redwood, also oak, maple, chestnut and other hardwoods are used where most easily available. Sometimes the scorched timbers of burned-over districts are used. When the heart of the timber is sound these have proved acceptable; they are cheaper than unscorched timber and are practically as strong.

"In Alaska there have been many objections given to the use of native spruce and native hemlock for mine timber. Some mining companies have preferred to ship in Douglas fir from Washington and Oregon instead of using the native woods. At present the amounts of Alaskan timber being used in the mines there are much larger than formerly. Experiments by the Forest Products Laboratory on Sitka spruce and Alaska hemlock indicate that the better grades of these woods compare favorably with lodge-pole pine and Douglas fir.

"A fundamental principle to be kept in mind is that mine timbering should afford adequate support at least expense. Enough timber should be used to insure safety to the workings and to the men, but as timbering is often one of the chief items of cost in mining, the excessive use of timber is an economic waste.

"Timbering serves primarily, by the prevention of caving and spalling, to keep the workings open for such time as is necessary for extracting the ore, or for purposes of transportation and ventilation. When the workings are abandoned, the timber therein has fulfilled its purpose and is so much waste material, although some of it may perhaps be recovered for reuse in other parts of the mine.

"Because timber suitable for use in mines is becoming increasingly scarcer in nearly all mining districts, and at many places must be shipped in, and because of the labor cost involved and the further fact that most mine timber cannot be recovered, there is greater and greater need for exercising good judgment in utilizing timber to the best advantage.

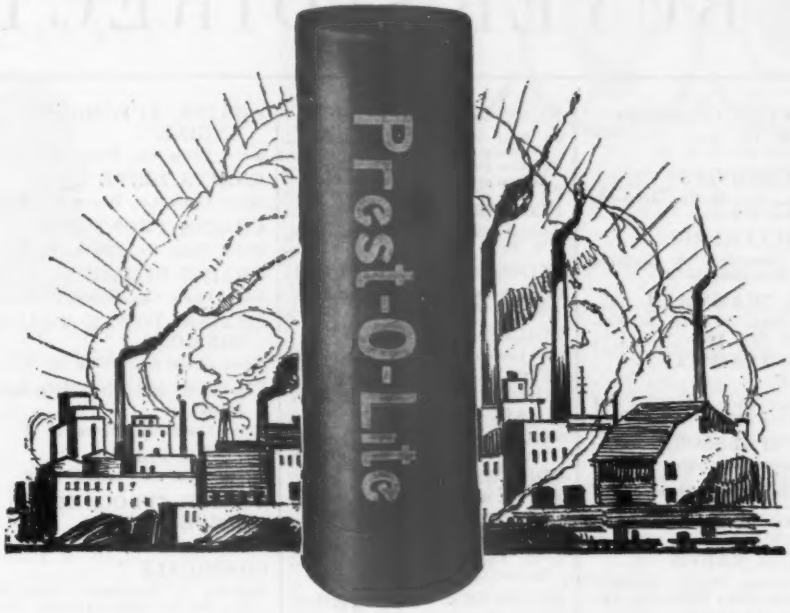
"The most important principle of mine timbering is to timber in time; that is, immediately after excavation and before the rock inside the natural rock arch becomes broken and begins to settle. If this principle is followed it will save time, money and many lives.

"The ventilation of a mine has considerable effect on the life of the timber. Damp, stagnant air will cause mold and fungus growth which will be followed by decay or rot. All timbered active places in mines should be well ventilated, and special provision should be made for the removal of the damp, hot air which is commonly found underground in pumping stations and around steam lines.

"Timbers used in mines are subject to destruction from decay and insect attack, breakage, mechanical wear and fire. It is estimated that under average conditions 50 percent of the total timber used is destroyed by decay and insect attack. Decay and its accompanying evil, boring by insects, the most destructive agencies acting on underground timber can be retarded by peeling and seasoning the timbers before use and by treatment with a suitable preservative. While it may not always be feasible for the small mine operator to use preservatives, peeling and seasoning timbers is always possible. Bark, when left on the timber, retards the evaporation of moisture, leaving the timber more easily attacked by fungus growths, and various wood-boring insects.

"The average life of green, unpeeled, and untreated timber used in a mine is from one to three years, but by peeling alone, the life of timber when used in dry mine workings may be increased 10 to 15 percent. There are several kinds of wood preservatives which have been used successfully on mine timbers—creosote, zinc chloride and sodium fluoride are the ones most commonly used. The bark should always be removed from the timbers before treatment."

During the coming year the Standardization Division of the American Mining Congress will continue its investigations, and will probably appoint a sub-committee of the Main Section on Mine Timbering to study the problem of reforestation.



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CAR DUMPS
Car-Dumper & Equipment Co., Chicago, Ill.

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CAR-HAULS
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Morse Chain Co., Ithaca, N. Y.

CHAINS, DRIVE
Morse Chain Co., Ithaca, N. Y.

CHAINS, FRONT END
Morse Chain Co., Ithaca, N. Y.

CHAINS, OILING
Morse Chain Co., Ithaca, N. Y.

CHAINS, POWER TRANSMISSION
Morse Chain Co., Ithaca, N. Y.

CHAINS, SILENT (Rocker-Joint)
Morse Chain Co., Ithaca, N. Y.

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Morse Chain Co., Ithaca, N. Y.

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Lehigh Coal & Navigation Co., Philadelphia, Pa.
Stonega Coal & Coke Co., Philadelphia, Pa.
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Ingersoll Rand Co., 11 Broadway, New York City.
Jeffrey Mfg. Co., 958 N. Fourth St., Columbus, Ohio.

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Roberts & Schaefer Co., Wrigley Bldg., Chicago, Ill.

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Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Goodman Mfg. Co., Chicago, Ill.
Ingersoll Rand Co., 11 Broadway, New York City.
Jeffrey Mfg. Co., 958 N. Fourth St., Columbus, Ohio.
Roberts & Schaefer Co., Wrigley Bldg., Chicago, Ill.

COAL MINE POWER PLANTS
Roberts & Schaefer Co., Wrigley Bldg., Chicago, Ill.

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CONTRACTORS
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Lidgerwood Mfg. Co., 96 Liberty St., New York City.

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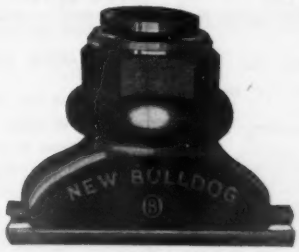

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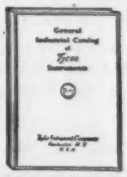

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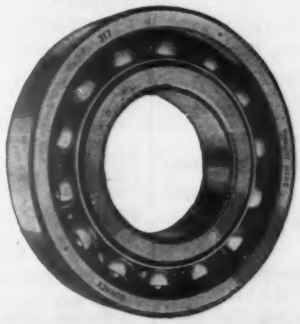

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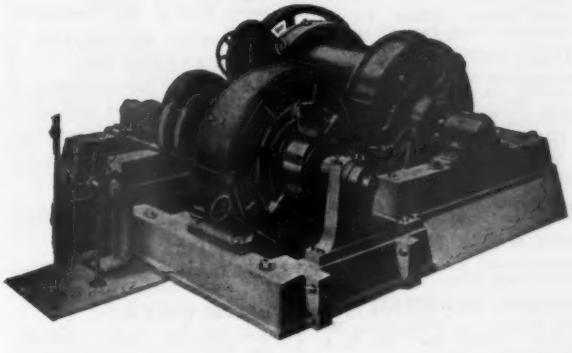

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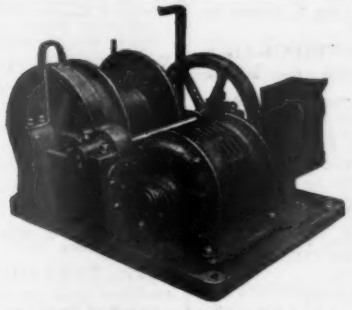

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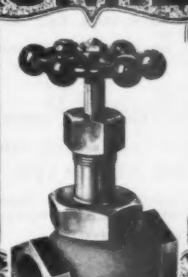

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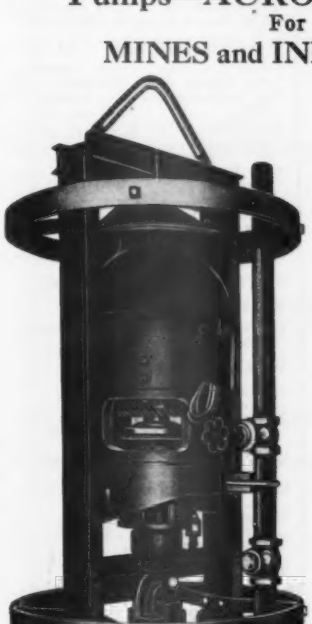

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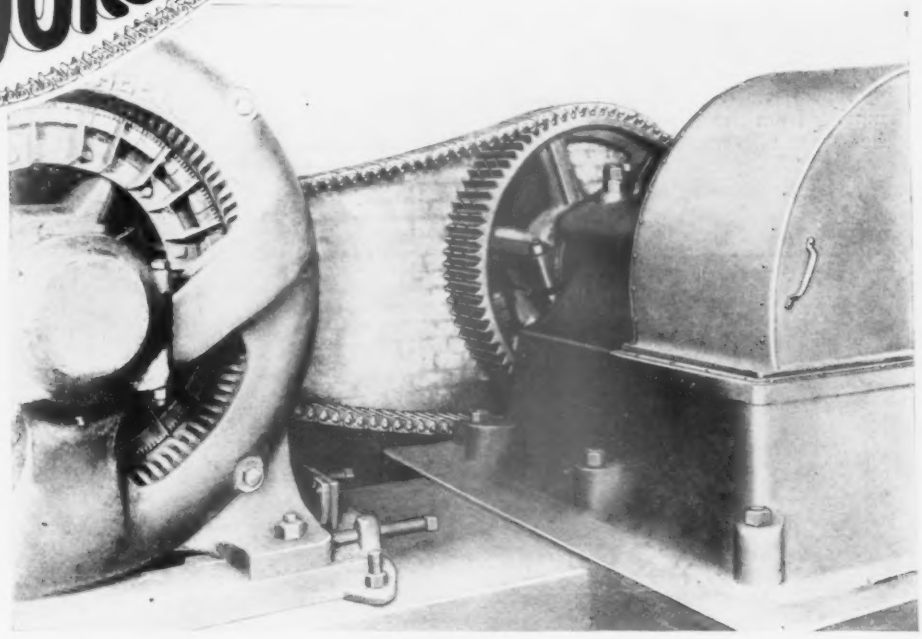

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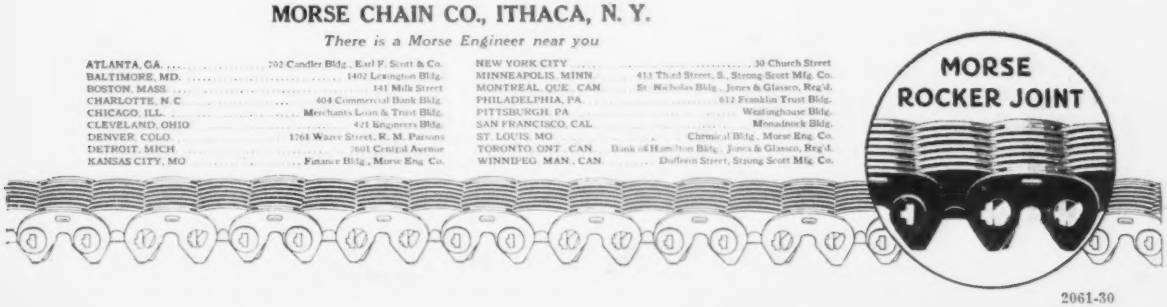

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The exterior view at the right shows the general arrangement of the Arlington Installation. Below the four big loading booms in the screen house with the Cross or Mixing Conveyor in the background. At the lower right the Scraper Retarding Conveyor running from the head house to the screen house.

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